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MAC CELEBRATES
FIFTIETH ANNIVERSARY

Supporting Logistics
Around the World

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Purpose	The <i>Air Force Journal of Logistics</i> provides an open forum for the presentation of issues, ideas, research, and information of concern to logisticians who plan, acquire, maintain, supply, transport, and provide supporting engineering and services for military aerospace forces. It is a non-directive, quarterly periodical published under AFR 5-1. Views expressed in the articles are those of the author and do not necessarily represent the established policy of the Department of Defense, the Department of the Air Force, the Air Force Logistics Management Center, or the organization where the author works.
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AFLC and Quality

General Charles C. McDonald, USAF
Commander
Air Force Logistics Command (AFLC)
Wright-Patterson AFB, Ohio 45433-5001

Quality drives Air Force Logistics Command. Recent achievements reflect this, and we see it in our plans for the future.

Since we began putting organized quality measures into practice three years ago, we have progressed a great deal. In fact, we have progressed so far that AFLC is competing for the President's Award for Quality and Productivity Improvement. It is the Federal Government's highest honor for advances in quality. We are proud of our people and their accomplishments in the Quality arena and believe we are on track with private companies that run successful quality programs.

There have been numerous challenges since we first committed to Quality principles. The Headquarters and Air Logistics Centers have reorganized, and we have managed a reduction-in-force. We have been hard at work with the Air Staff and our sister services on issues presented by the Defense Management Report, and we are well on our way to integrating AFLC with Air Force Systems Command (AFSC). These challenges have been manageable, and our decisions have been bolder and more creative by putting our Total Quality initiatives into action.

It was the progress of Total Quality Management (TQM) in AFLC and AFSC that helped convince Secretary of the Air Force Donald B. Rice that now was the time to integrate the two commands and form the Air Force Materiel Command (AFMC). The improved business practices and streamlining made possible by our successful TQM programs set the stage for the integration. These programs will ensure its success. Teams have been at work for months examining our processes to come up with the best ways of doing business in AFMC. We intend to have the finest organization of its kind in the world.

The nucleus of our Quality initiatives is people. Our goal is to have all Logistics Command employees trained, empowered, and trusted to perform their job right the first time. While leadership provides the objectives, resources, and support, it is teamwork, accountability, and recognition that are the hallmarks of our Quality structure.

The "how" of our initiatives is centered on the processes. Taking the steps to examine them, ensuring that we are not only doing things right but doing the right things, helps us keep a bead on customer requirements. This naturally leads to performance. Dedicated, professional people are empowered to accomplish tasks through processes they have designed. The proof that we are meeting these initiatives can be found in our products. The products we provide our customers, the Air Force's operational commands, meet or surpass existing standards and are supplied in the right quantities at the right times.

Let's not forget the bottom line of all this: to maintain combat readiness and sustain wartime operations. In Desert Shield and Desert Storm, I do not know of even one Air Force logistics showstopper. I attribute this directly to our people; their hard work; their dedication; and, yes, the Quality Agenda they support.

Another step in our Quality quest was reorganizing the Air Logistics Centers along product/service directorate lines to

achieve more efficient operations. Each Center's work force now supports specific products through an integrated weapon system

management product directorate. With this type of system, the customer can reach the "owner" more easily and work directly with a specific product directorate. The customer also can be served faster and more efficiently.

Now we are reorganizing the Headquarters, using quality concepts, as well as the principles of customer focus and employee involvement. The organizational structure is designed to improve customer communications, complement customer processes, and parallel our Center organizations. The designers of the system were the people who work the processes and their interfacing "customers." The method is working.

Headquarters staff members are communicating with their internal, Center, and Air Staff customers for continuous process improvement. And with the coming integration of AFSC and AFLC, we are placing even greater emphasis on customer focus, employee involvement, continuous process improvement, and partnerships. These will ensure AFMC operates as a team to provide superior weapon systems and logistics support, using a cradle to grave concept.

An important product of our reorganization is the Human Resources Development Directorate. This organization recognizes that empowered people must be educated and skilled, and is committed to revamping training and education for the AFLC work force.

Quality principles are introduced and communicated through the Training Development Plan, published in June 1989. It led to the development of five core training courses in Quality: Newcomer's Orientation, Quality Participation for Employees, Quality Leadership for Managers, Process Action Team, and a course for Facilitators. Most AFLC workers have received orientation training, and more than 30% have attended one or more of the other courses.

What are the major challenges on the horizon? The command integration is an enormous task. The key to our success in carrying out the integration has been and will continue to be Quality. Just as AFLC and AFSC will give way to AFMC, Total Quality Management will replace almost all of the old compliance and inspection-oriented quality assurance systems. The emphasis has been redirected from detection to prevention.

The Command has met past challenges and will meet those of the future. Quality precepts promise exciting prospects for all of us as individuals, and as members of the Air Force Materiel Command.



"AFLC SHINES IN DESERT SHIELD/STORM"

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Combat Logistics Versatility—AFLC Distribution

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Air Force Logistics Command (AFLC) Distribution personnel provide a key logistics element to the success of military operations during peace and war. Recent world events once again brought the importance of logistics immediately into focus for the 2,500 military and civilian personnel of the Oklahoma City Air Logistics Center (OC-ALC) Directorate of Distribution. The series of events are a matter of record: invasion of Kuwait, deployments, robusting war readiness spares kits (WRSK), surge support, around-the-clock supply and transportation support, expediting parts, packaging, and loading equipment on military and commercial aircraft and trucks. Supply and transportation Desert Shield/Storm requirements surged to record levels.

Readiness - A Quick Look Back

Civilian and military personnel within Distribution know about change. During the past couple of years, many facilities have been upgraded, additional warehouses automated, and complex computer systems implemented. More changes are on the horizon as Distribution's Transportation Operations Division implements the joint HQ MAC/HQ AFLC Optimal Airlift Distribution Study (OADS). Under OADS, CONUS MAC Aerial Ports of Embarkation (APOE) will realign, and airlift through Tinker's AFLC Aerial Port will intensify.

AFLC manages the contractor operated CONUS logistics airlift (LOGAIR) system. LOGAIR provides expedited air transportation between AFLC ALC integrated maintenance/supply depots and MAJCOM CONUS bases for weapon system parts. Each ALC has a contingency APOE role. The OC-ALC Distribution Air Terminal has a full-time dual role. In addition to the LOGAIR mission, Tinker supports MAC channel airlift to both PACAF and Europe. OADS expands the Tinker APOE role with both additional channels and flights. Airlift channels from Tinker to over 20 new destinations in Central Europe, the Mediterranean, North Atlantic, and North and South Pacific have been established.

The target OADS implementation date was 1 July 1990. Added military manpower began arriving, a phase-in period began, and Tinker was well on the way toward making an orderly increase to expected OADS cargo levels. However, world events were soon to greatly accelerate Tinker's airlift activity.

Reality of War

On 2 August 1990, halfway around the world as Americans slept, Kuwait was invaded by Iraq and quickly overtaken. The

world was affected, and a small segment of that world, Tinker's Distribution function, was among them.

A "Surge Center" was immediately activated to control and expedite the buildup and shipment of high priority parts overhauled at Tinker and destined for units deploying to the Middle East. Operation Desert Shield was soon to be a reality. Over the next few months, Distribution personnel packed and shipped over 10,000 repaired parts.

During the first week in August, a quarterly Mobility deployment exercise for Tinker's 552nd Airborne Warning and Control Wing (AWACW) went real-world. Other deployments followed. Mobility technicians and 170 directorate volunteers accomplished the movement of personnel and cargo from both on-base and off-base organizations. Initially, few personnel were fully equipped for deployment. However, supply personnel worked intently to ensure each troop was issued a full complement of mobility gear prior to departure. By the end of September, hundreds of tons of cargo and hundreds of troops had deployed from or through Tinker's Mobility Control Unit.

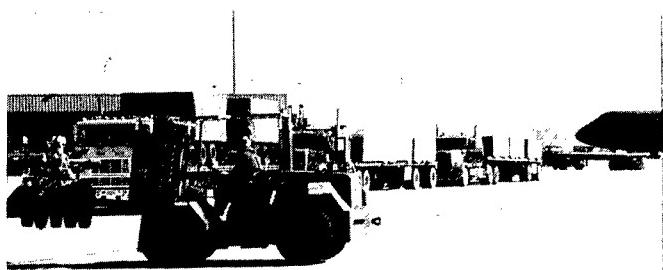
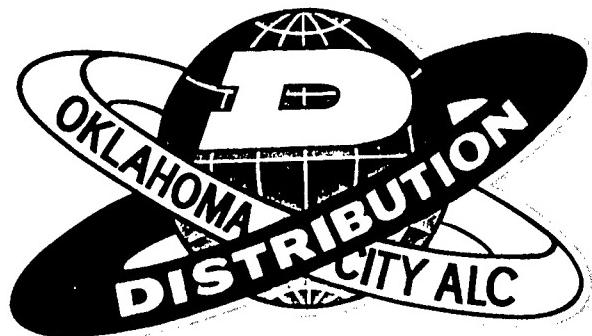
The impact on Distribution's Aerial Port was most dramatic. OADS planning and implementation were deferred. MAC airlift channels were realigned to provide direct airlift from Tinker to the Middle East Gulf region. Tents, cots, gas masks, desert uniforms, and chemical protective suits began to arrive via commercial trucks. Weapon system parts arrived via both LOGAIR and truck. For the next two months, supplies of all description continued to arrive from all over the west and central regions of the country for shipment to the Middle East. Tinker's APOE surged to receive over 800 truckloads of supplies for airlift.

When the Civil Reserve Air Fleet (CRAF) was activated, commercial B-747s, DC-10s, and B-707s supplemented airlift, sometimes exceeding the number of available MAC aircraft. The influx of aircraft and trucks was managed through top-notch initiatives and exemplary organization. Colonel Jon King, Chief, Transportation Operations Division, explained: "Flexibility was absolutely key to the outstanding success of our operation. We expanded to five separate receiving locations to accommodate the tremendous increase of cargo arriving by trucks. Then, each pallet was built for the specific type aircraft, MAC or commercial, on which it was to be loaded. Our folks did a terrific job coordinating each demanding phase of the airlift process. Superb teamwork was evident everywhere."

For the first time, the Tinker APOE shipped pallets of mail. Top priority was given to the troops' letters to and from home. Mail was readied for immediate shipment. Between 60 to 70 tons



Taxiways and aircraft parking spots were used to stage cargo all around the aerial port of embarkation.



The influx of aircraft and trucks was managed through top-notch initiatives and exemplary organization.



Civil Reserve Air Fleet sometimes exceeded the number of available MAC aircraft.



90 MAC flights a month increased to almost 400.



60 to 70 tons of top priority mail is airlifted daily.



Day and night, personnel worked in minus 35 degree weather. Snow and ice slowed but never stopped operations.

of letters and parcels were airlifted daily between November 1990 and February 1991.

Making It Happen

Requirements for more personnel and expanded facilities became readily apparent. Cargo was staged all around the APOE in parking lots and any place room could be found. An airfield taxiway, two aircraft parking spots, and the Mobility marshalling area were used as pallet grid areas. The new Base Supply Support Center was also pressed into service as a prime facility for cargo receipt and handling.

The Stock Control and Distribution (SC&D) system was reprogrammed on a priority basis to accommodate additional requirements for pallet identifiers. With super responsive programming support, software was modified to provide capability to manage approximately 1,100 pallet identifiers per channel.

Approximately 175 personnel from the local Tinker 2953rd Combat Logistics Support Squadron (CLSS), other Distribution areas, and the 72nd Aerial Port Squadron (APS) were called to help with the APOE activities already manned by almost 300 civilian and military personnel. The additional personnel were merged successfully into the Air Terminal work force with minimum disruptions.

Teamwork and Long Hours

The help arrived none too soon. December's workload was the heaviest ever at Tinker's APOE. Air Terminal Manager Jim Gibson explained: "At no time during the Air Terminal history have so few people moved so much cargo in such a short period of time. We shipped everything from vanilla pudding to rocket launchers."

Truck activity increased from 40 trucks during July 1990 to 800 in December 1990, and total tonnage airlifted increased from 3,500 tons to 13,000 tons respectively. Moreover, 90 MAC flights increased to almost 400.

Around-the-clock, tough workload came hand in hand with severe winter weather. Day and night, personnel worked in minus 35 degree weather. Snow and ice hampered but never stopped operations. Many aircraft landed during the bad weather; however, others delayed—waiting for breaks. The Roads and Ground crew ensured the ramp area remained clear. Runways, taxiways, and the APOE ramp were top priority.

When the breaks came, aircraft landed and landed and landed, one right after another. During the final 10 days of 1990, an aircraft, on average, landed every 75 minutes—the 9BU (Desert Shield) cargo backlog was significantly reduced.

Why We Do What We Do

The new year brought ever increasing requirements. Medical supplies, concertina wire, and munitions moved with the continuing resupply of meals-ready-to-eat (MRE) supplements, aircraft parts, etc. Talk of peace became talk of war. Operation Desert Shield became Operation Desert Storm.

Supply personnel worked diligently to fill a Tactical Air Command (TAC) request for High Priority Mission Support Kits. Deployed 3rd Combat Communications Group forces needed the kits to support intermediate and organizational level maintenance. Thousands of line items were used and thousands of requisitions were generated; the requirement was met quickly.

When the air war was joined by the ground war in February, supply and transportation, already at an all time high, intensified. Again, the APOE broke all records. Cargo processed for airlift reached almost 14,500 tons.

Then, on 27 February 1991, the eagerly awaited message came from President George Bush—cease-fire. Supply and transportation needs still remain critical. Supply is sustaining the troops until transportation can bring them home. Combat logistics versatility—made possible in a large measure by Air Force Logistics Command's Distribution team at Tinker doing what they do best.

Colonel James Corbett, Director of Distribution, commands the versatile and successful organization he leads: "I am extremely proud of our organization across the board. Our military, our civilians, our augmentees to a person gave 100 percent. We saw some tough times...long hours, terrible weather, and competing priorities. Our strategic airlift workload rivaled and frequently surpassed that of the MAC port at Dover on more than a few days. What we've done here in Distribution at Tinker is phenomenal—it's record setting."

Tinker's Distribution organization continues its mission to receive, store, pack, issue, and ship materiel to US military activities worldwide. During peace and wartime activities, this organization will remain ready. As Chief Master Sergeant Lew Case, an Individual Mobilization Augmentee, says, "Remain flexible, react to world situations, and work together." 

Air Force Logistics Command Wins 1991 President's Award for Quality

A dynamic dedication to Total Quality Management has led Air Force Logistics Command to be named the national winner of the 1991 President's Award for Quality.

The President's Award is given by the Federal Quality Institute to government agencies that exhibit great progress in quality. It is the federal equivalent of the prestigious Malcolm Baldrige Award that recognizes quality initiatives in private business.

"This award belongs to each and every employee in AFLC," said General Charles C. McDonald, AFLC commander.

"Quality is what allowed us to act swiftly in Desert Shield and Desert Storm, providing support to the flying units that was often beyond their expectations," General McDonald added. "The people in the command performed in a superb fashion."

Because AFLC has been practicing TQM for some time, senior leaders believed it was time to see how their organization stacked up to an objective, outside assessment. The President's Award for Quality was the perfect vehicle for that assessment.

The first step in the assessment was preparing an application package which highlighted AFLC's quality initiatives. This package was then judged according to eight interrelated criteria, such as Focus on the Customer and Employee Training and Recognition. Finally, a team of examiners from government and civilian organizations visited selected AFLC sites to validate the information presented in the application. The teams then submitted independent assessments to a panel of judges who made the final decision.

The award was presented 31 May in Washington D.C. at the Fourth Annual Conference on Federal Quality Improvement.

NEWS FLASH

Excerpt from AFLC News Release, 31 May 1991
(received at press time)

[REDACTED]

**Airlifting Air Logistics:
Warner Robins Air Logistics Center's
Support of Desert Shield Airlift Operations**

[REDACTED]

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Historian

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On 2 August 1990, the Middle Eastern nation of Iraq invaded the smaller Persian Gulf state of Kuwait. After only a few days, Iraqi forces defeated the small Kuwaiti military. On 6 August, with the fear of an Iraqi invasion, the government of Saudi Arabia requested military assistance from the United States; thus began Operation Desert Shield. Desert Shield soon became the largest deployment of US forces since the Vietnam War.¹

The period between 8 August 1990 and 15 January 1991 became a critical period for desert operations. These were the days of the deployment of hundreds of thousands of troops from the United States and other coalition allies (France, the United Kingdom, Egypt, Syria, etc.) along with thousands of aircraft, vehicles, tanks, and the logistical assets to support these forces in the Middle East. The deployment phase was the most critical, as the movement of assets to the Persian Gulf was crucial and had to be accomplished by the quickest means possible to keep Iraqi forces in check. The United States Department of Defense planned to deploy forces based in the continental United States, which meant the large number of American forces had one of the longest distances to travel. The DOD had two means of transporting these forces, along with tons of supplies and equipment: airlift using the Military Airlift Command's (MAC) cargo aircraft; or sealift using the Navy's large cargo ships. The quickest means by which it could be done involved airlift. The cargo aircraft could cover thousands of miles of airspace in a matter of hours, especially with the midair refueling capability of most of the airlift fleet versus the days and weeks needed to move the materiel of war by ship.

On 10 August 1990, the first elements of US forces arrived in Saudi Arabia, with the C-130s of the 317th Tactical Airlift Wing (TAW) delivering the forward elements of the 82nd Airborne Division. Over the next few days, the 82nd Airborne Division arrived in Saudi Arabia aboard MAC transport planes.² The necessity of using airlift became apparent when, on 22 August, President George Bush authorized the mobilization of National Guard and Reserve forces. A major part of the call-up was for specific units with airlift and cargo handling specialties.³ Units such as the 439th Military Airlift Wing (MAW), Westover Air Force Base, Massachusetts; 459 MAW, Andrews AFB, Maryland; and 514 MAW, McGuire AFB, New Jersey, received orders placing their members on active duty. As the airlift mission increased, more Reserve and National Guard members flew airlift missions to the Arabian Peninsula. In all, 85 airlift aircraft and their crews came on active duty to fly cargo missions to the Middle East during the initial deployment.

Some of the first casualties of Desert Shield involved those who were transporting supplies to the Middle East. On 29 August, a C-5B from the 68th Military Airlift Squadron, Kelly Air Force Base, Texas, crashed on takeoff at Ramstein Air

Base, Germany, killing nine of the ten reservists aboard the aircraft. By the end of the following months, airlift moved thousands of troops and millions of tons of supplies and equipment like tanks, aircraft, and spare parts onto the Arabian Peninsula.⁴ General H. T. Johnson, Commander-in-Chief, Military Airlift Command and the U.S. Transportation Command, indicated that the movement of personnel and equipment only materialized because "thousands of support people helped sustain the movement of U.S. forces."⁵

The period between 8 August 1990 and 15 January 1991 became critical to the success of desert operations. These were the days used to deploy forces and logistical assets before the start of hostilities between Iraqi and coalition forces. Though airlift was the means by which the materiel of maintaining the peace in the Middle East arrived, such a massive airlift would not have been possible without an air logistics support system.

The air logistics mission was accomplished by people and units at the Air Force Logistics Command (AFLC). For AFLC, Operation Desert Shield became a crucial matter of supporting American service members at breakneck speed. According to Colonel Philip J. Williams, Director of Operations and Contingency Plans, Headquarters AFLC: "The logistics system is designed to handle and cope with global demands; but to ensure units going to the Gulf could operate at maximum capability, we accelerated parts repairs and aircraft maintenance."

One of the Air Logistics Centers supporting Desert Shield was the Warner Robins Air Logistics Center (WR-ALC) where personnel operated a key logistics center to support US air forces in the Middle East, especially the airlift mission.⁶ On 7 August, the day President Bush agreed to the Saudi request for US military assistance, the WR-ALC Battle Staff, under the command of Major General Richard F. Gillis, convened for the first of many meetings to plan strategy for fulfilling the demands of Desert Shield. Between 8 August 1990 and 16 January 1991, WR-ALC's mission for supporting airlift operations fell into three categories: air logistics, accelerated or compressed production, and mobility.⁷

Categories of Support

Air Logistics

Within 24 hours of activating forces, the first airlift began. During the build-up, WR-ALC personnel handled 159 assorted aircraft, carrying passengers and cargo from Robins to the Middle East. Of those aircraft, 118 came from MAC, 26 from the Strategic Air Command (SAC), and 15 others from the Commercial Reserve Air Fleet (CRAF). The largest number of

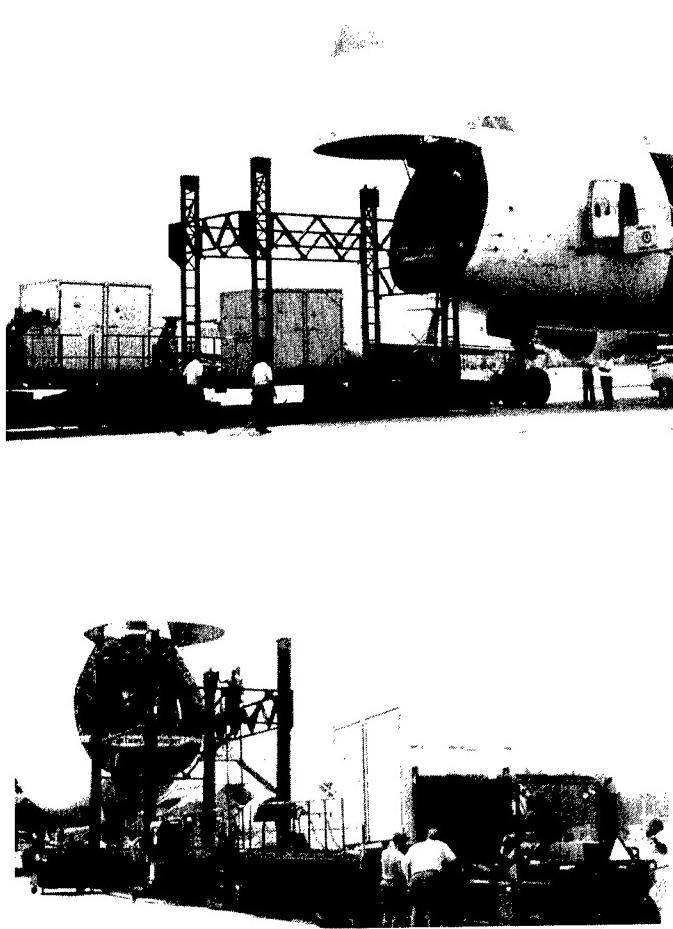
aircraft arrived in the first 60 days of the operation; 103 aircraft from varied sources flew in to receive cargo bound for the Middle East.⁸ During the initial surge of airlift, MAC and SAC did not possess enough aircraft to meet the growing demand for airlift. On 17 August, General Johnson activated Phase One of the CRAF which used commercial airliners and cargo aircraft to carry troops and cargo to the Middle East.⁹ The first CRAF aircraft, a Federal Express Boeing 747, arrived at Robins on 22 August 1990. By the end of the initial deployment, the CRAF had ceased flying into Robins.¹⁰

During the first two months of the airlift, AFLC bases processed nearly 16,000 short tons of Desert Shield cargo.¹¹ The Air Freight Terminal at WR-ALC marshalled and loaded 16,749 items weighing a total of 2,853.3 tons. By the completion of Desert Shield, WR-ALC processed, marshalled, and loaded over 4,702 tons of cargo for airlift to the Middle East. The Base Mobility Control Center processed 1,381 Air Force and other service members for flights to the Middle East. In those first months, the Center's personnel, finance, chapel, legal, hospital, security police, and food services personnel expended 5,000 man-hours to prepare forces deploying to the Middle East. Their actions included processing wills and powers of attorney, immunizations, official documents, and temporary duty pay, and issuing weapons and ammunition. The organizations that processed through the Center were the 5th Combat Communications Group (CCGP), 19th Air Refueling Wing (AREFW), 2955th Combat Logistics Support Squadron (CLSS), elements of the 2853rd Air Base Group (ABG), the 2895th

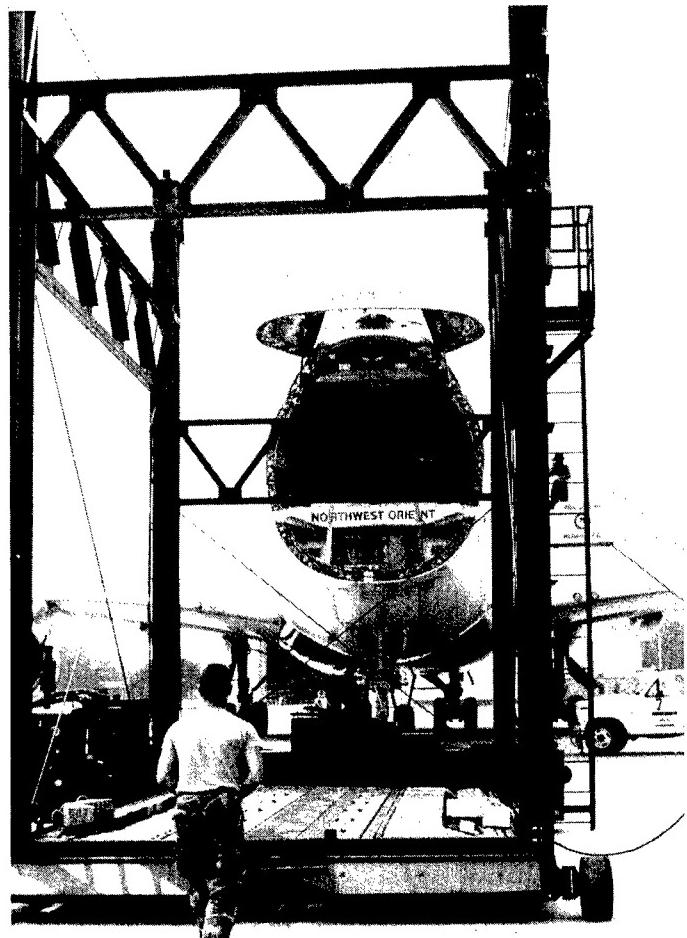
Distribution Squadron (DSQ), 402 CLSS, and 4400th Mobility Support Flight, as well as United States Marine Corps (USMC) and US Army personnel.¹²

Cargo handling for most of the military aircraft, such as Lockheed C-5Bs, C-130s, and C-141Bs from MAC and Boeing and KC-135s from SAC, was not too difficult for the Air Freight Terminal at Robins. Just a few months earlier, WR-ALC personnel had developed a method to load palletized materials onto the Boeing KC-135R so the SAC units at Robins could deploy some of their assets themselves. This initially helped them prepare for some of the exercises in which they participated. The McDonnell-Douglas DC-8s, flown by the CRAF, were not a problem to load, but SAC's McDonnell-Douglas KC-10 and the CRAF Boeing 747s were a problem. For the B747, cargo handlers loaded pallets through a section of the nose of the aircraft which pivoted directly above the cockpit area of the fuselage. On the KC-10, the cargo loaded through a door on the side of the aircraft. The standard K-loaders used on the base could not raise cargo high enough to support these aircraft; so, initially, it was thought that Air Freight Terminal personnel would have to load these aircraft with forklifts. This process was slow so the Air Freight Terminal personnel began looking for a cargo loader that could accommodate the big Boeing 747s and KC-10s.

During a discussion about the Boeing 747s and KC-10s coming to Robins, Sergeant Shawn Parsons spoke to the Air Freight Terminal chief and deputy about his experience with these aircraft and their loading requirements in Turkey. While in



Air Freight Terminal personnel using the Wilson Loader to place cargo aboard a CRAF (Northwest Orient) Boeing 747. (U.S. Air Force)



Turkey, Sergeant Parsons had dismantled a Wilson wide-bodied loader used to handle cargo for large commercial airlifters and had shipped the loader to US Army dock facilities in Bayonne, New Jersey. Personnel from the Air Freight Terminal contacted the army depot and found the Wilson loader was still at Bayonne. Robins then sent a team consisting of Sergeant Parsons from the Air Freight Terminal, some civilians from Intelcom Inc., and some Department of Defense contracted vehicle drivers to Bayonne to dismantle the loader, put it on trucks, and ship it to Robins. It took over eight hours, longer than expected, to dismantle the loader. The 18 large pieces of the loader proved hard to disassemble; but, once the loader arrived at Robins, Air Freight Terminal personnel quickly assembled it and used it to load the Boeing 747s and KC-10s which were constantly arriving at Robins.¹³

Robins AFB personnel also assisted the massive airlift requirements resulting from Operation Desert Shield by flying a series of short-range airlift sorties to various staging areas along the East Coast. These sorties were flown in an excess Lockheed C-130B aircraft that was temporarily in storage at Robins. The members of the 2875th Flight Test Squadron (FTS) flew the sorties with operational support from the Air Force Reserve. The sorties supplemented the MAC airlift system by transporting priority cargo including materiel and passengers to the East Coast staging areas. These short-range sorties allowed for the timely movement of these resources and the sorties freed more MAC aircraft to provide direct theater support of Operation Desert Shield.¹⁴

Surge/Accelerated Production

Between early August and the end of October 1990, the ALCs accelerated maintenance on 31 aircraft. On 8 August, the different divisions¹⁵ at WR-ALC began producing the aircraft, avionics, spare parts, and other critical items needed to support our airlift for the desert forces. Between 8 August 1990 and 13 January 1991, the Center produced 26 C-141s—19 of these were completed in just the first two months of Desert Shield! To accomplish this amazing feat, WR-ALC compressed the production schedules for the C-141s (Figure 1). In the case of the first five C-141s to leave the depot, C-141 production line personnel deleted the aircraft's paint scheme to return the aircraft to duty sooner. By 10 October 1990, the nineteenth C-141 rolled off the production line. These activities increased the Center's workload requiring additional man-hours. Overall Aircraft Production personnel used 49,800 overtime hours to produce all the aircraft (to include four F-15s and an AC-130). The C-141 production line alone expended 44,300 overtime hours. Over the next three months, seven more C-141s were produced under normal production criteria. Lockheed C-141s were not the only airlift aircraft produced at WR-ALC; it also turned out C-130s. Though MAC did not make demands for C-130s, WR-ALC personnel continued to produce them under normal conditions. Between 8 August 1990 and 16 January 1991, the C-130 production line produced 12 aircraft.¹⁶

Aircraft were not the only items subject to a compressed schedule; Center directors compressed production of avionics, aircraft spare parts, and other items associated with airlift activities. In the case of aircraft components, WR-ALC received the requirements for 108 National Stock Number items or 3,928 separate pieces (including those for WR-ALC depots) and produced 3,470 or 88.3% of the requests (Figure 2). In the first months of Desert Shield, AFLC repaired over 22,000 aircraft parts. At WR-ALC, avionics technicians received orders for

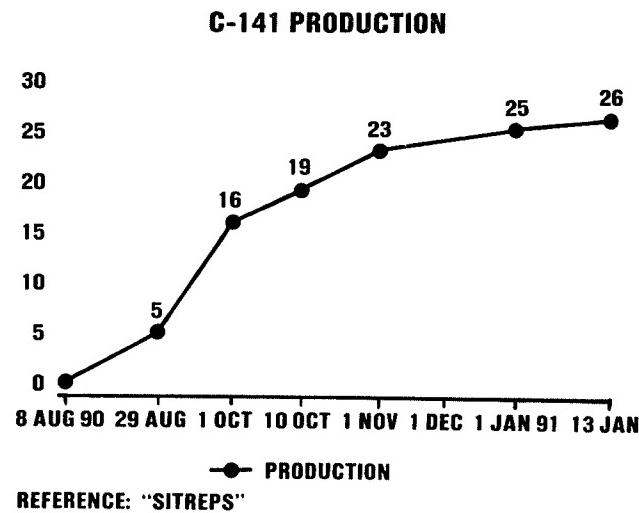


Figure 1.

electronic modules for the C-5B and radio receivers for the C-141B. In the first 52 days, avionics technicians received orders for 74 line items or 1,920 separate pieces and produced 1,749 (or 91.1%) of the components. The biggest problem they experienced was a lack of parts to replace or repair a component. This hampered production for two of the three aircraft. One item which experienced difficulty was the APS-133 weather radar. Shortages of replacement parts slowed production of this system for the C-141s.

However, a method was devised to accomplish organic repair of the system. Production in the Industrial Products Division (now Directorate) was slowed because of lack of assets. The surge of aircraft production significantly increased the demand for gyros. In response to this demand, Industrial Products was able to produce similar gyros to the units which were needed. These gyros had the same capabilities, weighed no more than the other gyros, and were provided with no delays to the demanding unit. This action was critical in preventing delays in completing work on the C-141s.¹⁷

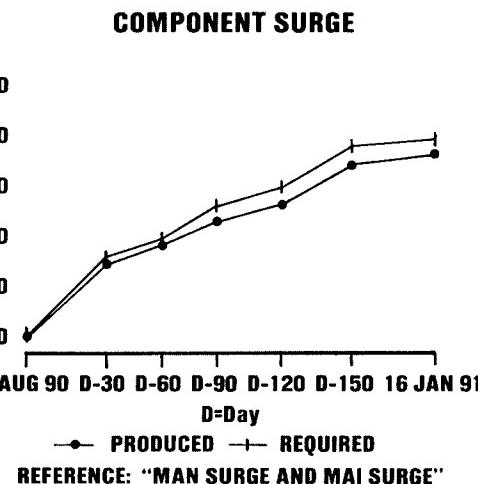


Figure 2.

The Vehicle Directorate (Vehicle Division until 1 October 1990) managed shipment of all the vehicles needed for the USAF during Desert Shield. This Directorate also managed vehicles and materials handling equipment. The Air Force required different kinds of vehicles for ground support operations. The most critical included materials handling equipment, such as forklifts, that could operate in the desert, as well as fuel trucks and fire trucks to support the critical aircraft at the forward bases. A grand total of 2,113 vehicles were command levied in support of Desert Shield. Additionally, the Vehicle Directorate, acting as the functional logistics office for the Harvest Falcon/Harvest Bare equipment, supported our desert force through shipments of the total Air Force's inventory of mobile shelters, mobile aircraft hangars, parachute shops, laundry facilities, shower/shave units, kitchens, and dining halls, as well as the tents for personnel beddown. With the threats by Saddam Hussein to use all methods to kill coalition forces, including chemical weapons, protection from chemical warfare was critical for all personnel in the Arabian Peninsula. This Directorate procured and shipped the vitally required chemical warfare masks and hoods needed by USAF personnel.¹⁸ When this activity experienced shortages, they located and acquired the needed vehicles and materials handling equipment from various sources including contractors. This Directorate was also the primary source for the acquisition and logistics support for all DOD agencies for cargo pallets and nets. Military Airlift Command needed an additional 463L pallets, top nets, and side nets. The Vehicle Directorate procured 42,087 436L pallets, 35,462 top nets, and 43,317 side nets for the airlift for supplies. When this Directorate could not produce these items, they received permission to contract out for the additional needed pallets and nets. This action helped increase the availability of the nets and pallets to support the airlift units.¹⁹

Mobility

Besides making the parts for the airlift assets, WR-ALC sent personnel to the Middle East to perform maintenance work. The 2955 CLSS deployed members to perform aircraft battle damage repair on airlift assets. These personnel trained for the eventuality of performing emergency repairs on the airlift aircraft if damaged from combat related actions or major mechanical problems. They also supported members of the airlift units sent to the Middle East who had the primary responsibility of maintaining the airlift fleet. The 2955 CLSS not only deployed personnel to the Middle East, but also to Charleston AFB, South Carolina, at the request of HQ MAC. The team sent to Charleston AFB helped to keep the 437 Military Airlift Wing's C-141s flying round-the-clock. While at Charleston, the team accomplished both flight-line and shop maintenance activities.²⁰

Conclusion

Speed was essential to winning in the Middle East. Airlift was the means by which it was achieved, but the airlift missions accomplished by MAC were only a part of the overall picture. Without the assets of aircraft, aircraft parts, and other items, the C-5s, C-130s, and C-141s would have been able to only do part of the job needed to support the forces in the Middle East. Warner Robins ALC played a key role in the air logistics mission, not just by accelerating aircraft, spares, and other equipment needed for airlift, but also through the initiative of its commander, directors, and production line personnel who supported the airlift mission in other ways. The missions flown by the 2875 FTS and the maintenance work performed by the 2955 CLSS helped units

both in the Middle East and in the US to keep the planes flying and the logistical pipeline flowing. Though lessons learned from previous wars had been used in the desert operations, one lesson echoed from a war fought over 125 years ago is that success comes from "getting there the fustest with the mostest."²¹ Airlift got there first, with troops and equipment, but not alone. They were supported by the logisticians, technicians, and other personnel at the ALCs.

Notes

¹Merit Student's International Year Book, 1991, s.v. "Military Affairs, U.S."

²"Forces being deployed to Saudi Arabia," *USA Today*, 15 Aug 90, p. 5A; "U.S. forces to date," *USA Today*, 16 Aug 90, p. 6A; "US Troops Rush to Saudi Arabia," *Atlanta Journal and Constitution*, 8 Aug 90, pp. A-1, A-10; "Fort Stewart troops gear up nervously for call to the front," *Atlanta Journal and Constitution*, 10 Aug 90, p. A-9.

³"Bush Calls Up 40,000 Reservists," *Macon Telegraph and News*, 23 Aug 90, p. 1; "Reserve Call-Up of 49,703 get Pentagon Go-Ahead," *Atlanta Journal and Constitution*, 24 Aug 90, p. A-1.

⁴Sergeants, "The Persian Gulf, No Day at the Beach," Oct 90, pp. 8-11; "U.S. Mideast forces nearing 60,000 troops," "Desert Forces Still Short on Supplies," *Macon Telegraph and News*, 27 Aug 90, p. 1; "'Naked and nervous:' Desert Bases Hurting for Vital Equipment," *Atlanta Journal and Constitution*, 27 Aug 90, p. 1.

⁵SMSgt Gilbert, Douglas J. Airman, "Airman Express," Sep 90, pp. 10-11.

⁶Gilbert, Airman, "Logistics Lifeline, Sustaining Desert Shield," Nov 90, p. 22.

⁷Merit Student's International Year Book, 1991, s.v. "Military Affairs, U.S.;" "Saudi Arabia"; and "Robins Opens Up to Reveal Its Role in Desert Shield," *Robins Rev-up*, 31 Aug 90, pp. 1 & 2.

⁸Report (U), 2853 ABG/XPI, "Mobility Status," 1 Oct 90 and 16 Jan 91.

⁹U.S. Steps Up Operations in Middle East," *Robins Rev-up*, 24 Aug 90, p. 1.

¹⁰Report (U), 2853 ABG/XPI, "Airlift Schedules," 8 Aug 90 - 15 Jan 91.

¹¹See note 4.

¹²Report (U), WR-ALC/XPI, "Mobility Status," 1 Oct 90; Briefing (U), Maj Gen Richard F. Gillis, WR-ALC Commander to WR-ALC personnel, "State of the Center Address," 6-8 Nov 90 (Hereinafter cited as State of the Center Address).

¹³State of the Center Address. "Distributor Again Hooks Up With Aircraft Loader," *Robins Rev-up*, 31 Aug 90, p. 3.

¹⁴Memo for Record (FOUO), WR-ALC/HO, with Capt Alan Scheibe, 2875 FTS, "Operation Desert Shield - RATS," with attachments, 24 Oct 90 info used Unclassified; Note (U), Colonel M.M. Macias, WR-ALC/RFTo Maj Gen Richard F. Gillis, WR-ALC/CC, "Support of Robins Airlift by Air Force Reserve and National Guard," Mar 91.

¹⁵On 1 Oct 90, the Directories of Maintenance and Materiel Management were divided into separate product directores, each managing all of the depot-level activities for a particular weapon system.

¹⁶See Figure 1 for the accelerated aircraft schedule. "C-141's skip paint job to join Desert Shield," *Robins Rev-up*, p. B-2, 5 Oct 90; "Work Load Increases as Center Continues Desert Shield Support," *Robins Rev-up*, 24 Aug 90, pp. 1-2; Telephone Conversation (U), WR-ALC/HO, SSgt James C. Mesco with Don Hamric, C-130 Production, 20 Feb 91, State of the Center Address.

¹⁷See Figure 2, "Report (U), WR-ALC/MAN, "Surge Exchangeables," 5 Nov 90; Slides (U), WR-ALC/MAN, "MAN Surge Items," 6 Sep 90, Report (U), WR-ALC/MAN, MAN Surge Information, 2 Nov 90; Slides (U), WR-ALC/MAI, "MAI Surge Items," 12 Oct 90; Report (U), WR-ALC/MAI, "MAI Surge Information, 1 Oct 90.

¹⁸Message (S/DECL OADR), WR-ALC/BS to HQ AFLC/CRC, "Situation Reports (U)," 8 Aug - 1 Oct 90 (Hereinafter cited as SITREPs) (information used Unclassified); Letter (U), WR-ALC Vehicle Directorate to the WR-ALC Office of History, "Coordination of the FY90 History," 1 Mar 91.

¹⁹State of the Center Address, SITREPs.

²⁰"Robins Opens Up to Reveal Its Role in Desert Shield," *Robins Rev-up*, 31 Aug 90, p. 1-2; Message (U), 2955 CLSS Deployed Charleston to 2955 CLSS RAFB, "Desert Shield Maintenance Support," Sep 90; Message (U), 2955 CLSS Deployed Charleston to 2955 CLSS RAFB, "Desert Shield Maintenance Support - Report Three," 041451Z Oct 90; Message (U), 2955 CLSS Deployed Charleston to 2955 CLSS RAFB, "Desert Shield Maintenance Support - Report Four," not dated Memo (U), 94 AMU/OIC to 2955 CLSS/CC, "Telephonic Conversation," not dated.

²¹Quote attributed to Lieutenant General Nathan Bedford Forrest of Tennessee, Cavalry Officer, Confederate State of America, 1821-1877. Bruce Catton, *The American Heritage Picture History of the Civil War* (New York, 1960), p. 358.

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THE MILITARY AIRLIFT COMMAND: A Short History, 1941-1991

The organization that eventually became the Military Airlift Command was born of necessity in mid-1941 as World War II engulfed the world. The United States Army Air Forces created the first military air transport unit in the nation's history, the Air Corps Ferrying Command (ACFC), on 29 May 1941, to move American-built aircraft to the United Kingdom as part of President Franklin D. Roosevelt's lend-lease program. This pioneer organization launched its first flight on 1 July 1941, from Bolling Field, DC, moving American bombers to Scotland via Montreal and Newfoundland. Through mid-October 1941, when winter forced closure of this European route, ACFC completed an average of six round trips per month. Searching for another route by which to ferry aircraft to the British, Brigadier General Robert Olds, ACFC commander, inaugurated military transport service between Washington, DC, and Cairo, Egypt, on 14 November 1941. Within months ACFC established branches off this main route to transport lend-lease materiel to the Soviet Union and to the British in India and North Africa.

By the time that the Japanese attack on Pearl Harbor thrust the United States into World War II, the fledgling ACFC had already delivered about 1,350 aircraft to the British and her allies. America's entry into the conflict and the need to transport additional aircraft and war materiel overseas greatly expanded the activities of ACFC. The command developed additional air routes to supply wartime theaters and acquired new aircraft with more cargo space and greater range. This expansion of the air transport function prompted the Army Air Forces to rename ACFC the Air Transport Command (ATC) on 20 June 1942, and to give it global responsibilities. The War Department named ATC the department's agent, responsible for transporting personnel, mail, and materiel during the war. The Secretary of War further directed that ATC control and operate all the Army's assigned overseas air routes. By the end of August 1942, the command had added the functions of the Contract Cargo Division of the Air Service Command and the air evacuation of sick and wounded personnel to its mission responsibilities. In large measure, the transport service operated under centralized control without interference from theater commanders except in specific emergencies.

In mid-1942 ATC had two divisions: Ferrying and Air Transport, and five foreign wings: North Atlantic, Caribbean, South Atlantic, Africa-Middle East, and South Pacific. The command also operated a domestic wing which ferried aircraft within the United States, and a special air mission squadron under the Air Transport Division to provide airlift for the president and other dignitaries. In October 1942 the command activated the Alaska Wing to deliver aircraft to the Soviet Union and the India-China Wing to resupply allied forces in China. New wings were added and expanded as activity increased during the war, and later many were redesignated divisions in recognition of their size and scope of mission.



Proud MAC: SUPPORT AMERICA CAN ALWAYS COUNT ON

The most spectacular ATC operation of the war began on 1 February 1942, after the Japanese cut water and land access to China. President Roosevelt decided to resupply allied forces in the Chinese interior by air. During this aerial resupply operation, known as the "Hump" because the route crossed the dangerous Himalayan mountain ranges, ATC's C-46, C-54, and C-87 aircraft and crews moved thousands of tons of supplies from eastern India to allied forces in the Yunnan Province of China. For almost three years of contending with 16,000-foot mountain peaks, violent turbulence, harsh monsoon seasons, severe cold and icing, and enemy attacks, ATC maintained a slender logistical pipeline to China, delivering nearly 650,000 tons of supplies and proving that air supply was a viable means of supporting armies in the field.

After World War II, ATC continued its global transportation mission with significantly fewer resources as the postwar mobilization took place. At near the same time, however, ATC's mission expanded and became more inclusive when the National Security Act of 1947 created the new Department of Defense and established the United States Air Force as a separate service. This was reflected in a 15 January 1948 memorandum signed by Secretary of Defense James F. Forrestal which created the Military Air Transport Service (MATS) as the single organization managing strategic airlift operations. This command, which began operation on 1 June 1948, embodied not only ATC's airlift resources, but also four squadrons of the Naval Air Transport Service and several technical organizations: Air Weather Service (AWS), Air Rescue Service (ARS), and Airways and Air Communications Service (AACS). These services had been part of ATC's organization since March 1946.

The first test for MATS came 25 days later, on 26 June 1948, when the Soviet Union blockaded all land and water routes to West Berlin, a city jointly occupied by allied forces since the end of the war, but located deep within Soviet-controlled territory. The service's foremost airlift expert, Major General William H. Tunner, headed an impressive international endeavor to supply the besieged city. During the next 15 months, aircraft from western Germany arrived in the city on an average of one every three minutes. MATS crews and their counterparts from other nations, assisted by weather and communication personnel from MATS, delivered 2,325,000 tons of food, medical supplies, fuel, and clothing to West Berlin. Finally, on 30 September 1949, after the Soviet Union had reopened the surface routes to Berlin following a negotiated settlement, the Berlin Airlift ended.

On 25 June 1950, less than a year after the end of the Berlin airlift, Communist North Korea invaded its American-supported neighbor to the south in an attempt to reunite the Korean peninsula under northern rule. United Nations (UN) forces under the command of General of the Army Douglas MacArthur entered South Korea and pushed the invaders back to the north. For the next three years, while the armies fought back and forth

across the Korean landscape, MATS resupplied the UN forces by air. Operating a logistical pipeline of nearly 10,000 nautical miles, General Laurence S. Kuter, MATS Commander, organized a remarkable system that by the time the cease-fire agreement had been signed on 27 July 1953, had transported nearly 80,000 tons of cargo and 214,000 personnel from the United States to the Far East. The command also greatly improved its aeromedical airlift capability, transporting many thousands of wounded to medical facilities within the theater and returning 66,536 patients to the United States during the contingency.

Although MATS officials took pride in the command's accomplishments during the Korean conflict, they realized that MATS needed newer aircraft. The workhorse of the fleet during the 1950s was the propeller-driven C-124. Although a dependable and versatile aircraft, the C-124 did not possess the range, speed, and cargo capacity to carry out effectively the command's global airlift responsibilities. After much planning, a fundamental step toward modernization came in April 1965, when the first jet cargo aircraft, the C-141 "Starlifter," entered the MATS inventory. Capable of transporting 67,620 pounds of cargo 4,000 miles at speeds approaching 440 knots, the C-141 has served MATS (and its descendent the Military Airlift Command) well as a strategic airlifter. The "Starlifter" and the larger C-5 "Galaxy," which entered the inventory in late 1969, has provided effective airlift support for the nation's widespread commitments since that time. Congress acknowledged the importance of this airlift capability by directing that MATS be redesignated Military Airlift Command (MAC) and placed on an equal level with other USAF combat elements, effective 1 January 1966.

Meanwhile, in the mid-1960s, the United States military involvement in Southeast Asia increased rapidly and posed the greatest test of MAC's strategic airlift capability since World War II. For nine years (1964-1973) the command managed a complicated, 10,000-mile-long supply route to and from Southeast Asia. MAC transported about two million tons of materiel and more than two million personnel during this period. As an example of specific support, between 17 November and 29 December 1967, MAC C-141s and C-133s flew 413 missions and transported 5,118 tons of equipment and 10,355 101st Airborne Division paratroopers from Fort Campbell, Kentucky, to Bien Hoa, South Vietnam. This operation, named EAGLE THRUST, was the largest single airlift of combat troops from the United States to a war zone up to that time and contributed to the defeat of North Vietnam's 1968 Tet Offensive. Additionally, when the cease-fire agreement went into effect in early 1973 and North Vietnam released 566 American prisoners-of-war, MAC C-141s airlifted the former captives from Gia Lam Airport, Hanoi, to Clark AB, Philippines, and then to the United States. Finally, just prior to the fall of South Vietnam, in April 1975, MAC's strategic airlift fleet evacuated 50,493 refugees from South Vietnam.

As MAC's involvement in South Vietnam declined, the command's commitments expanded elsewhere. When President Richard M. Nixon called upon MAC to transport military equipment and supplies from the United States to Israel to aid in the war against Egypt in late 1973, the command responded quickly and efficiently. During a single 32-day period, MAC C-141s and C-5s flew 422 missions and carried 22,395 tons of critical war materiel from 20 American ports to Lod International Airport, outside Tel Aviv. Moreover, MAC determined to respect the airspace of neutral nations and carried the cargo along a narrow, 6,450-nautical-mile-long route over international

waters. By comparison, the Soviet Union flew 935 missions to Egypt, over a 1,700-mile route, and delivered only 15,000 tons of war materiel in 40 days.

During the summer of 1974, Headquarters USAF directed MAC to assume responsibility for tactical airlift and its strategic forces. Consequently, on 1 December 1974, MAC absorbed first the continental United States tactical airlift assets, previously controlled by Tactical Air Command (TAC), and then, on 31 March 1975, those that had been responsible to the Air Force's overseas commands: Pacific Air Forces (PACAF), United States Air Forces in Europe (USAFE), Alaskan Air Command (AAC), and United States Air Forces Southern Command (USAFCO). This consolidation greatly expanded the command's airlift role and ushered MAC into a new age of greater emphasis on combat and intratheater airlift. The expansion of transport functions and the growing recognition of airlift as a primary ingredient of successful military operations prompted Congress to designate MAC a specified command, responsible directly to the Joint Chiefs of Staff for contingency activities, effective 1 February 1977.

MAC has continued its many and varied worldwide airlift activities in support of national policies since then. In November 1978, for example, when Congressman Leo J. Ryan and four associates were murdered and 911 members of the Peoples' Temple church in Jonestown, Guyana, committed mass suicide, the president directed MAC to fly graves registration teams, medical personnel, and cargo to Guyana and to evacuate the remains of the victims to the United States. In several days of grisly activity, MAC and Aerospace Rescue and Recovery Service personnel used HH-53 helicopters to remove the bodies from the remote village of Jonestown to the international airport at Guyana's capital of Georgetown. C-141s then airlifted the remains from Georgetown to the military mortuary at Dover AFB, Delaware. Also, when the nuclear reactor at the power plant on Three-Mile Island malfunctioned on 31 March 1979, MAC C-141s flew 15 missions, transporting special equipment and supplies to the plant and removing contaminated water samples to proper disposal sites.

The Military Airlift Command also had an important and recurring role in the nation's response to the Iranian Revolution and hostage crisis of 1978-1981. In December 1978, with political tensions and anti-government disturbances in Iran threatening the safety of United States military dependents living there, the Joint Chiefs of Staff directed MAC to provide airlift assistance to those desiring to leave Iran. Two C-5 and nine C-141 missions moved more than 900 dependents from Teheran to Europe or the United States. Seeing little chance for a peaceful solution to the turmoil in Iran, the State Department then urged all dependents to leave that country. Consequently, during the first two months of 1979, amid more violent demonstrations prompted by the departure of the Shah and the return of the Ayatollah Khomeini, MAC evacuated another 4,900 dependents, 687 tons of cargo, and 169 pets. By November 1979, most of the American officials and virtually all the dependents had left Iran, before radicals stormed the American embassy in Teheran and captured members of the staff. When the Iranians released the hostages after 15 months, on 19 January 1981, two MAC C-9s picked up the freed Americans in Algiers, Algeria, and airlifted them to Rhein-Main AB, West Germany, for medical examination and rest. A week later a VC-137 from MAC's 89th Military Airlift Wing transported the ex-hostages to Stewart Airport, New York, where families and friends welcomed them back to the United States after their 444 days of captivity.

The diversity of mission and the far-reaching activities of MAC grew even more complex when, on 1 March 1983, the command assumed responsibility for all remaining phases of airlift operations within the Air Force. On that date all Air Force special operations forces (the 1st Special Operations Wing, Hurlburt Field, Florida, and detachments directed by USAFE, PACAF, and USAFSO) joined with the Aerospace Rescue and Recovery Service to form the new Twenty-Third Air Force with headquarters at Scott AFB, Illinois. Charged with the mission of combat rescue and special operations, this new numbered air force culminated many years of effort to bring together all airlift functions under a single manager. Equally important, in May 1990 Twenty-Third Air Force was split away from MAC and redesignated the USAF Special Operations Command, recognizing further the importance of this unique mission.

Both the command's conventional and special operations forces were able to demonstrate their capabilities in Operation URGENT FURY. After a bloody coup by leftist elements in the Caribbean nation of Grenada, MAC airlifted 15,374 tons of cargo and 35,911 passengers on 52 C-5, 853 C-141, and 286 C-130 missions, between 25 October and 2 November 1983, in support of American and Organization of East Caribbean States' troops who rescued American nationals in Grenada and restored democratic institutions to the island. During this operation, MAC evacuated 709 noncombatant Americans from Grenada to the United States aboard 16 C-141, one C-5, and two C-130 missions. On 17 C-130, five C-5, and five C-9A aeromedical airlift missions, MAC also transported 164 wounded soldiers from the island to stateside medical facilities. Also, Twenty-Third Air Force MC-130s and AC-130s played notable roles in securing the island. Finally, MAC completed URGENT FURY by transporting 755 Cuban prisoners from Grenada to Barbados during 20 C-130 missions between 4 and 9 November 1983.

In the 1985 Defense Appropriation Act, Congress adopted legislation sponsored by Senator Jeremiah Denton (Rep-Alabama) which mandated certain humanitarian assistance programs. The Military Airlift Command, as the Department of Defense's single airlift manager, has participated constantly in activities resulting from this legislation. Beginning in 1985, MAC transported privately donated humanitarian cargo to Central America on a space-available basis. In 1986 Senator Denton and other supporters expanded the legislation to include aircraft to all regions of the world. Through September 1990, MAC had airlifted more than 3 million pounds of private, humanitarian cargo to Latin America, the Philippines, Antigua, Cook Islands, and the Caribbean Basin.

In addition, MAC has flown numerous missions in support of government-mandated relief programs. Spectacularly, in September 1985, MAC flew 25 C-5 and C-141 missions carrying a wide range of disaster relief equipment and supplies, including dog teams, fire trucks, helicopters, and communications equipment to Mexico following a devastating earthquake. In 1988 MAC was involved in supporting firefighters in forests throughout the western United States. The fires, started by lightning or man and fanned by drought conditions, threatened numerous towns and recreation areas, including Yellowstone National Park. The command was called upon to airlift firefighters, equipment, and supplies to those disaster locations, flying more than 70 missions using C-5, C-141, and C-130 aircraft during August and September. With C-130 units from the Air Force Reserve and Air National Guard, MAC also flew many fire suppression missions.

A major organizational change to MAC's structure came on 1 October 1987, when the United States Transportation Command was activated at Scott Air Force Base. As a unified command under the Joint Chiefs of Staff, this new organization was charged with maintaining a worldwide mobility system for use in contingency situations. It incorporated the Military Airlift Command, the Military Sealift Command, and the Military Traffic Management Command as air, sea, and land components. MAC's commander in chief also served as commander in chief of this unified transportation command, and many of MAC's key staff members functioned in a dual capacity as well. The incorporation of MAC into the United States Transportation Command signaled the beginning of a new age in airlift history, as MAC exchanged its specified command status for that of a component of a unified command.

This change has not affected the scope and breadth of the command's activities, however, for the personnel of the Military Airlift Command have been heavily involved in numerous contingency, sustainment, and humanitarian operations since 1987. Beginning in 1988 the command began airlift support of the on-site inspection activities for the Intermediate-Range Nuclear Forces Treaty, a 13-year renewable treaty between the United States and the Soviet Union to eliminate an entire class of nuclear weapons. In addition, following the devastating December 1988 earthquake in Soviet Armenia, MAC provided airlift for relief workers and supplies assisting with the recovery. These activities represented the first time since World War II that MAC aircraft had been allowed to fly in the airspace of the Soviet Union without a Soviet navigator aboard.

In addition, from 17 December 1989 through 14 February 1990, the Military Airlift Command was heavily involved in Operation JUST CAUSE, a military operation in Panama to protect American lives and assets and to place in power the democratic government elected in May 1989. The command conducted the largest night airdrop since World War II on 20 December, when paratroopers landed and seized Torrijos/Tocumen and Rio Hato Airfields in Panama. For all of JUST CAUSE, MAC organic aircraft and a few contracted commercial flights airlifted 39,994 passengers and 20,675 tons of cargo on 775 missions. Just a few months after JUST CAUSE, MAC participated in Operation DESERT SHIELD, the deployment of American forces to Saudi Arabia to counter a threat from Iraq after its invasion and annexation of Kuwait. Beginning the operation on 7 August 1990, during the first 30 days of the deployment, MAC flew more than 1,900 airlift missions and delivered more than 43,500 tons of cargo and 60,000 passengers to the theater. This airlift deployment represented the largest, within the same space of time, in the history of the command and exceeded the level of operation conducted by MAC in 1968 at the height of the conflict in Southeast Asia.

Throughout its history MAC has been involved daily in the implementation of national policy throughout the world. In peace or war, military air transport has been a tool for the successful execution of American foreign policy since first organized before the beginning of World War II. Whether it be sustaining American presence, projecting military resources in a crisis, or assisting in humanitarian missions, MAC has been present around the globe. No other Air Force major command has been as consistently versatile in executing its mission. No other command has such a unique, varied, and far-reaching history.

Dr Roger Launius

The Hump Airlift to China, 1942-1945: An Epic in the American Military Assistance Program



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"The Japanese may have cut the Burma Road," announced United States President Franklin D. Roosevelt in February 1942, "but I want to say to the gallant people of China that no matter what advances the Japanese may make, ways will be found to deliver airplanes and munitions to the armies of China. We remember that the Chinese people were the first to stand up and fight against the aggressors in this war."¹ This commitment to support the Chinese government of Chiang Kai-shek fighting more than a million Japanese troops on the mainland of China precipitated a major military assistance program and the most extensive airlift yet undertaken by the United States. From this announcement, until the end of World War II in August 1945, the United States Army Air Force (AAF) personnel conducted a relentless campaign over some of the most treacherous terrain in the world to transport critical war materiel to allied forces in China.

While the military assistance provided to Great Britain and the Soviet Union during World War II has received considerable attention, the aid to China had tremendous significance both for the war effort and for future strategic doctrine, for it demonstrated the viability of airlift as a means of delivering war materiel to allies. During much of the war, the airlift over the Himalayas was the only link between Major General Claire L. Chennault and the Fourteenth Air Force, General Joseph Stilwell's mission to China, and Generalissimo Chiang Kai-shek's Chinese National Army and the outside world. This route, then, provided the logistical support for the defense of China. Throughout the war, personnel involved in the Hump airlift, a 500-mile aerial pipeline over the treacherous Himalayan Mountains, flew approximately 180,000 missions delivering more than 650,000 tons of war materiel. In the process, their units lost over 800 aircraft and 1,000 men. But they accomplished their purposes, and by the end of the war the Hump airlift was operating with business-like precision.²

The story of the Hump airlift of World War II really began a few years earlier, in 1937, when the Japanese first invaded China from the East. Republican China resisted this action and developed a scorched earth strategy of trading territory for time as it pleaded with the western Allies for military assistance. This assistance came in the form of lend lease supplies and equipment and the American Volunteer Group (AVG), a rowdy gang of misfit fliers under the command of General Chennault who made a name for themselves as the "Flying Tigers." With the Japanese attack on Pearl Harbor on 7 December 1941, the United States was drawn into the fighting and forced to reassess its priorities for assistance to its allies. While it tried to continue its support of China, President Roosevelt and other government leaders believed that first priority must be given to assist Great Britain in defeating Germany, and the China theater received less attention.³

Although unable to provide China as much assistance as he wished, President Roosevelt wanted desperately to keep the country in the war to contain the large numbers of Japanese forces fighting there. It was critical, therefore, that allied forces

in China receive sufficient supplies to fight a holding action against the Axis troops. The Japanese, on the other hand, were intent on defeating China rapidly and ending a significant and continuous drain on their resources. The Japanese high command determined that allied aid must end so they moved to secure Burma. In late December 1941, they invaded this British colony, throwing 100,000 men and 700 aircraft into the campaign. Although the British fought well, they were unable to defeat this massive force and capitulated in April 1942. China was completely cut off from the outside world, or so it seemed.⁴

Even before Burma's loss, General Henry H. (Hap) Arnold, Commander of the AAF, had recommended to the President that an air route from India to China be developed because of the difficulty of sustaining ground supply lines. He worked to ensure this capability and encouraged the chartering of the China National Aviation Corporation (CNAC), a company jointly owned by Pan American World Airways and the Chinese government, which had pioneered an air route between India and China over the Himalayas in the 1930s, to supply Chinese forces. This airline, however, possessed insufficient resources to support the allied effort and the Army Air Force's Tenth Air Force, headquartered in India, became involved. On 8 April 1942, Colonel William D. Old made the first military flight over the Hump.⁵ Thereafter, the Army Air Force deployed additional assets to India and the airlift began to grow. Starting as a mere trickle, in April and May 1942, the first two months of the operation the Americans delivered 196 tons and CNAC delivered 112. With the beginning of the monsoon seasons in June, however, the traffic declined drastically; that month the Tenth Air Force delivered 29.6 tons and CNAC none. Gradually the airlift increased slowly through the rest of 1942 until by November, the two organizations together were delivering over 1,000 tons per month.⁶

This was unacceptable because Generalissimo Chiang Kai-shek, locked in a dire struggle with the Japanese, insisted that these figures be increased to over 10,000 tons per month immediately to support the defense of China. The failure of the Tenth Air Force's Hump operation resulted from several factors. The number of aircraft and personnel assigned to the airlift was insufficient to carry much beyond the capacity of 1,000 tons per month. The problems, always fearsome, associated with weather, terrain, and interference from Japanese fighters, made operations difficult. The lack of maintenance capability in the theater meant that many transport aircraft were grounded with malfunctions. Finally, several logistics personnel noted that General Stilwell, and Brigadier General Clayton L. Bissell and Brigadier General Earl L. Naiden, respectively Tenth Air Force's Commander and Chief of Staff, all displayed a certain hesitancy about conducting the Hump airlift. Frank D. Sinclair, Aviation Technical Advisor of China Defense Supplies, Inc., made a study of the operation and characterized their attitudes as "defeatist." All these factors combined to inhibit the Hump airlift.⁷

Whatever the reasons for failure, the Air Staff began to study alternative means of handling the Hump airlift. As a result, on

21 October 1942, the Air Transport Command (ATC), charged with all aerial resupply efforts for the war, was asked to accept responsibility for the Hump operation. Inferred in this directive was the understanding that the Tenth Air Force had not properly used its transport assets and that ATC was the best qualified of all Army Air Force commands to handle military transport.⁸ Effective 1 December 1942, the units operating the airlift were transferred to ATC and redesignated the India-China Wing, commanded by Colonel Edward H. Alexander, who was one of Stilwell's staff officers although he had previously been executive officer of the Ferrying Command and understood well the nuances of military assistance airlift operations.⁹

To the men who served with the India-China Wing, the resupply efforts over the Hump were every bit as difficult and dangerous as those involving strategic bombing in Europe. Out of the steaming, tropical valleys of India's Assam Province, the transport crews flew fully loaded transports northeastward over the Himalayas, the so-called Hump, into southwestern China, usually landing at the principal United States airdrome at Kunming.¹⁰ If an aircrew chose a direct flight path over the Hump during optimum weather conditions, they could make the flight in some four hours at a maximum altitude of about 16,000 feet. This route, however, necessitated flying over a portion of northwestern Burma, territory securely held until 1944 by the Japanese. To avoid this, many aircraft commanders detoured to the north, flying a distance of 720 miles and crossing the Hump at the northwestern end of its lowest peaks at some 16,000 feet.¹¹ In both cases, the aircrews had to be prepared to operate at altitudes approaching 20,000 feet, a task not without difficulties in the aircraft assigned to the operation.¹²



A C-46 in the Assam Province of India is loaded with bombs bound for Maj Gen Chennault's Fourteenth Air Force in China.

Weather conditions alone were enough to make the Hump route the most treacherous military assistance program undertaken during the war. Fully six months out of the year, Hump aircrews contended with monsoons that drenched the countryside, created turbulence, and made operations practically impossible. Colonel Alexander wrote to a superior in 1943: "The weather here has been awful. The icing starts at 12,000 feet. Today a C-87 went to 29,000 feet on instruments, was unable to climb higher, and could not get on top. It has rained seven and a half inches in the past five days. All aircraft are grounded."¹³

So extreme was the weather that at first the Japanese Air Force did not consider the airlift a threat to the China offensive and ignored the flights. Later, as the airlift became more successful,

Japanese patrols attacked Hump transports with some regularity. On one occasion a C-47 flying the Hump airlift actually scored a victory over a Japanese Zero. When two enemy fighters attacked, the pilot dove between mountain peaks to elude them. The aircraft lost one Zero, but the second stayed with them. "That character must have been trying to ram us because he never swerved," the pilot recalled. "He just missed the C-47 but afterward, he kept right on going and we watched him explode as he hit the side of the mountain."¹⁴ Later in the war, the ATC Hump operation used two C-47s for search and rescue operations that each had two Bren .30 caliber machine guns.¹⁵

Colonel Alexander, as a believer in the capabilities of air transport to supply allied fighting forces, was tireless in his efforts to increase tonnage on the airlift. He demanded and received additional aircraft and support equipment and was able to obtain a few additional personnel. Most critical, however, he never had enough qualified pilots. "Get me some aircraft crews if it is humanly possible," he begged. "I hate to see good, serviceable aircraft sitting on the ground with no one to fly them. An airplane doesn't need to sleep."¹⁶

If there was a pivotal event in the history of the Hump airlift, it was unquestionably the Trident Conference between the Allied nations held in Washington DC in May 1943. Its primary purpose was the determination of the time and place for the invasion of Europe, but Roosevelt also used it to formulate a unified policy for Asia. In April 1943, General Chennault had visited Washington to convince the President and the Joint Chiefs of Staff that his plan for an aggressive air offensive against the Japanese in China was the key to victory in Asia. The success of such a campaign, however, rested on the ability of ATC to increase the amount of war materiel it carried over the Hump. President Roosevelt had accepted this plan's feasibility and he engineered its adoption at the Trident Conference. As a result of its ratification, the President directed that ATC push its cargo supply activities to 5,000 tons by July, 7,500 tons by August, and 10,000 tons per month by September 1943. Known officially as "Project 7," Colonel Alexander called it less formally the "July-September Objective," and later "The 10,000 ton objective." Overworked airmen assigned to the Hump operation had less kindly names for it.¹⁷

To accommodate this new requirement, the Commanders of the India-China Wing, Colonel Alexander and his successors, Colonel Thomas Hardin and Brigadier General Earl S. Hoag, received a greater priority in assignment of aircraft, personnel, and other resources. The President also directed that materials, equipment, and personnel be shifted from road building to airfield constructions. Consequently, the India-China Wing's officials oversaw the construction of several new airdromes on both sides of the Himalayas. Construction was so extensive that, by the end of the war, ATC pilots were using 13 bases in India and six in China, a marked expansion from less than three years previously when the Hump pilots shuttled between one airdrome on each end. In the backcountry regions of Asia, this accomplishment was nothing less than phenomenal. Since heavy equipment was at a premium, the commander of the Services of Supply (SOS) units in the theater, Major General Raymond A. Wheeler, used civilian laborers for the difficult process. These workers chipped large rocks into gravel by hand, carried them to the runway site in baskets or by oxcart, and then graded the field manually using hand-operated rollers. The Services of Supply units employed thousands in this work; at one airfield on the Yangtze River, China, more than 100,000 people labored to construct a single 6,000-foot-long airstrip. The results, while not

spectacular, pleased aircrews who found these bumpy and rocky strips quite serviceable.¹⁸

Despite terrific expectations and exertions, the objectives set for the Hump airlift were not met on schedule. An important aspect of this development was the poor morale of those assigned to the airlift. Virtually every commander commented on this difficulty when reviewing Hump operations. First, the living and working conditions made the mission particularly perilous to those not used to the subtropical environment of India. The impressions of Lloyd S. Gray, an enlistee assigned to an airdrome at Dum-Dooma, India, were probably common. Gray commented that India's heat was virtually unbearable, observing, "Kipling's line 'Mad dogs and Englishmen go out in the mid-day sun' really means something to me now." To beat the interminable heat, Gray stood in line for an hour to get a spoonful of ice cream that had just arrived. "When I get home I am going to live on cold drinks and ice cream," he said. "[I] never knew I could miss anything so much."¹⁹

The accommodations also left a great deal to be desired. Gray thought that India had more insects per capita than "any other place in the galaxy"; moreover, they seemed to love Americans for they infested practically every bunk in the theater. Primitive working conditions also plagued the men who worked in this theater. Eric Sevareid, who covered the China-Burma-India Theater for the CBS Radio Network, visited a Hump base at Chabua, India. "There were at this time absolutely no amenities of life—no lounging places, no Red Cross girls, nothing cool and refreshing to eat and drink, no nearby rest resort to visit on leave. It was a dread and dismal place." When "luxuries" became available, even though rationed, they were certainly the highlights of the day. Private Gray reported on 21 September 1943 that Post Exchange items had just arrived and he and everyone else at the airdrome stood in line for the privilege of buying the limit: one towel, a package of peppermint wafers, two packages of gum, one bar of Lux soap, one tube of toothpaste, a container of shaving cream, a bottle of ink, one *Liberty* magazine, and a box of Kleenex.²⁰

Another factor inhibiting the airlifters' morale was the belief that they were carrying too many low priority supplies for use by rear echelon units rather than real war materiel. Moreover, they believed that too much of the supplies they brought into China at such high cost were being taken and sold by unscrupulous Chinese leaders. General Arnold, upon returning from a meeting with Generalissimo Chiang Kai-shek in early 1943, commented on the corruption rampant among Chinese leaders. He said Stilwell documented report after report. The second son of the Governor of Yunnan was the leader of a smuggling ring, the Chinese Fifth Army commander received about \$6,000 per day to support his army but not a penny went to the troops, and the Chinese 13th Division commander was head of another racketeering ring. And so it went. "Anything that is done will be done," Stilwell said, "in spite of, and not because of, the Peanut [Stilwell's name for Chiang Kai-shek] and his military clique."²¹ These difficulties certainly led to less enthusiasm by Hump airlifters.

In spite of the poor morale, the men were a resolute bunch who

took an uncommon amount of pride in their work. The Hump aircrews even adopted the characterization of one unimpressed observer who wrote that they were "living like dogs and flying like fiends." Often they flew up to 165 hours per month, pursuing the 650-hour requirement for rotation to the United States. Many developed a unique and slightly morbid sense of humor and spirit about their work. Units and aircrews competed to see which could carry the most cargo, fly the largest number of sorties, have the fewest accidents, and squeeze the most flying hours out of an aircraft. Some Hump pilots laughed at the dangers of the operation, joking about the aluminum-plated trail beneath them where comrades had crashed. Complaining about the lack of respect they received from fighter pilots, one Hump veteran said, "What the hell? A pursuit plane has six 50-caliber guns in front of him and 400 mph in his engine. We fly the same country with a pistol and a Tommy gun."²²

Slowly, with the India-China Wing's more effective organization and greater Air Staff support, the Hump airlift totals began to rise during the latter part of 1943. The airlifters did not meet the 10,000 objective on schedule, but in December 1943 they surpassed it, only four months behind schedule. Recognition for this achievement came the next month when President Roosevelt awarded the India-China Wing a special citation, the first time such a military organization had been recognized in this manner. General Chennault, commenting on this accomplishment, addressed the India-China Wing commander, "I am particularly anxious that your pilots and crews know that only through their efforts can we accomplish these important missions."²³

These increases, unfortunately, came with heavy losses in both men and equipment. Between June and December 1943, there were 153 major aircraft accidents on the Hump route, and 168 crew fatalities resulted. Brigadier General Cyrus R. Smith, Deputy Chief of Staff for ATC, commented:

We are paying for it [increased tonnage over the Hump] in men and planes. The kids here are flying over their head—at night and in daytime and they bust up for reasons that sometimes seem silly. They are not silly, however, for we are asking boys to do what would be most difficult for men to accomplish; with the experience level here we are going to pay dearly for the tonnage moved across the Hump. . . . With the men available, there is nothing else to do.²⁴

To ensure pilot competency, ATC immediately instituted more stringent flight checks. This had only modest success.

It did, however, have the effect of increasing safety awareness. Captain Bliss K. Thorne recalled his first flight over the Hump in 1943. As the aircraft reached cruising altitude, the pilot gave Thorne the controls and went to the cargo compartment to check the 55-gallon fuel drums they were carrying. When he found three drums leaking noticeably, a common problem in the unpressurized aircraft at the high altitude needed to fly over the Hump, he jockeyed them back to the cargo door and pushed them²⁵ out into the jungle below. Sometimes pilots refused to take off until certain maintenance or loading procedures that had been omitted were corrected.

In spite of this awareness, sometimes grisly accidents took place. Lloyd Gray, for instance,



reported on 11 October 1943 that a C-47 from his base in Assam blew up just after take-off, killing the entire crew. Those at the runway, according to Gray, "Said she was loaded with gas and ammunition, and the pilot almost refused to take off because he did not think the loading was properly done. Those who saw it said there was just a big puff of smoke and she was gone." Later, Gray added that, because of the accident, "Morale is at an all-time low here. The new men especially are practically refusing to fly." This incident did not stop the airlift, however. Private Gray probably summarized most of his comrades' feelings when he wrote, "I don't want to go, but duty is duty. If I had wanted to win the war from behind a desk I would have stayed in the States."²⁶

The wing also inaugurated a more aggressive search and rescue operation designed to bring in aircrews abandoning their craft quickly and safely. On 2 August 1943, for instance, a cargo-laden C-46 and 17 passengers flying from Chabua, India, to Kunming, China, had an engine failure forcing abandonment over some of the roughest terrain of the flight. The crew and passengers, including William T. Stanton of the United States Board of Economic Affairs; John Davis, a Department of State official serving on General Stilwell's staff; and Eric Sevareid, bailed out and landed safely. The only fatality was the copilot whose parachute apparently caught on the tail section. Search and rescue aircraft soon went into action and spotted the survivors in the jungle. Since the harsh terrain prevented the immediate rescue of the group, the aircraft dropped emergency supplies. Because several of the survivors needed medical attention, Colonel Donald Flickinger, a physician, and two enlisted personnel parachuted to assist them. Thereafter, a British patrol was sent from a forward Indian base into the jungles to link up with survivors and escort them to safety. All told it took two weeks for the party to return to civilization, but it suffered no other casualties in the episode.²⁷

The materiel carried over the Hump continued to rise throughout the first months of 1944. In June 1944 the India-China Wing delivered over 15,000 tons, in August it transported over 20,000, and by November the tonnage figures had risen to 34,914 per month. To support this rate, transport aircraft took off for the Hump an average of once every three minutes. Even as the tonnage of Hump resupply rose, on 3 September 1944, Brigadier General William H. Tunner replaced Brigadier General Thomas Alexander, who had succeeded General Hoag as commander of the wing in March 1944. General Tunner already had gained recognition for making ATC's Ferrying Division into the largest and most efficient activity in the command. His mission as commander of the redesignated India-China Division was twofold: to increase tonnage while decreasing accidents.²⁸

General Tunner was a superb administrator whose talents were well suited to these tasks and he soon initiated several improvements to the system. First, Tunner gained increases in the number of personnel and aircraft assigned to his command; from 249 aircraft and 17,032 men in December 1944 to 332 aircraft and 22,359 men at the end of the war. Still these resources were insufficient for Tunner's vision of the Hump airlift. He sought to demonstrate the need for more personnel by using civilians and, at least in India, elephants to help load aircraft. "I did hire elephants which loaded gasoline drums from trucks into C-46 airplanes," remembered Tunner. "I later had the pictures of Indians scrambling all over the airplanes, washing them down, and the elephants loading gasoline drums, and sent them back to my bosses . . . hoping that they would see that I was in great need of personnel." Tunner added, however, that this ploy backfired.

His superior responded with a note, "Since you've done so well in hiring indigenous personnel and elephants, I shall have to take some more men away from you to send to Southeast Asia."²⁹

Second, Tunner developed with his staff a comprehensive safety program. They prepared a statistical tracking program to determine the causes of aircraft failures, the airfields where the most accidents took place, the type of weather involved, the model of aircraft most prone to accident, maintenance deficiencies, and a host of other questions. Tunner remarked, "To answer these and many other questions, Captain Stiles (the division's flight safety officer) set up statistical systems which were certainly the best in effect in any theater at the time, and are still good today." This information, coupled with more rigorous flight checks, aircrew physicals, and an efficient safety awareness program proved most useful in combating accidents.³⁰

Third, Tunner also took a major step toward greater aircraft reliability while decreasing maintenance time by introducing Production Line Maintenance (PLM). This procedure required an aircraft to be towed through a succession of seven maintenance stations where specially trained crews performed specific maintenance operations. To make this feasible, each Assam base specialized in one type of aircraft repair; consequently, repair operations could be more efficient and effective. At Tezgaon Field, for example, maintenance crews specialized in C-54 aircraft and could move each through the PLM line in 22 hours. The stations were:

- (1) Initial engine run-up; general inspection of aircraft and forms; work planning.
- (2) Airplane wash and polish; cowlings removed, engines sprayed and cleaned; sumps drained.
- (3) Carburation; communications, propellers and anti-icer system.
- (4) Power plant, ignition system plugs removed, lubricating system, power section, engine controls; oxygen system; painting of placards and insignia; rigging and surface controls.
- (5) Instruments; automatic pilots; electrical system, engine section, fuselage section; hydraulic system, landing gear; wheels and brakes, tires; de-icer system; general lubrication.
- (6) Final inspection; replacement of operational equipment.
- (7) Preflight, final run-up, servicing.³¹

Although at first Tunner encountered some opposition to this maintenance concept, he persisted and within a few months had each base successfully involved in the project. The number of operational aircraft rose because of PLM from 75% in January 1945 to 85% before the end of the war. The daily utilization rate also rose sharply during the same period, increasing from 7.51 hours per aircraft per day in April to 11.65 hours in July 1945, the last full month of operations. The time required for the 100-hour aircraft inspection was also reduced 25% during these months.³²

Each of these actions increased tonnage and decreased accidents. The Hump operation delivered 44,098 tons in January 1945; by July this had increased to 71,042 tons. All the while the accident rate dropped from 23 accidents and 36 fatalities in January to only 8 accidents and 11 fatalities in the last full month of the war. With the end of hostilities in August 1945, the Hump airlift declined swiftly, dropping to 53,315 tons in August to 1,429 tons in November, the month it ended.³³

Today the Hump airlift of World War II invites serious reconsideration as an epic in military assistance. It could be divided into three major episodes, each having its own special place in the history of the war and the evolution of the Air Force. First, from its inception in April 1942 to the summer of 1943, the airlift was little more than a primitive barnstorming

operation; the resourceful personnel involved scrapping to gain additional men and aircraft, supplies, and equipment to support the allied forces in China. During this period, the airlift was at best a second-class operation that had low priority among the overall wartime goals of the Army Air Force. Second, between the summers of 1943 and 1944, General Hoag and Colonel Hardin presided over an expansion of the airlift in response to the increased importance placed on offensive operations in China and Burma. Third, after mid-1944, the airlift entered its most mature phase. Under General Tunner, who marshaled greater resources and enjoyed a higher priority for assistance than any previous commander, the Hump airlift resembled a big business involving the largest and most complex mass transport system in history.³⁴

Although much less well known than the aid to Great Britain and the Soviet Union, unquestionably the Hump airlift of war materiel to China made possible the continuation of its resistance to the Japanese. Between 1942 and 1945, 81% of all supplies entering China came via the Hump. Without these supplies, the Chinese defense would not have been able to continue. As it was, the allies in China were able to avoid being crushed by Japanese military might. The Japanese imperial Army was forced to maintain 1.2 million troops and uncounted numbers of valuable resources on the Chinese mainland. Had it achieved a quick victory there, Japan could have left a small occupation force in China and moved the remainder of its force to oppose the Americans in the Pacific, perhaps making the island-hopping campaigns more costly than they were.³⁵

The Hump Airlift also had critical importance for the development of American foreign policy thereafter. The researchers preparing the Strategic Bombing Survey following the war recognized its significance:

The major significance, for the future, of all air operations in CBI was the development of air transport operations. During the first year of the war, the magnitude to which Air Transport operations could be developed was not appreciated. However, the terrain of Burma and China and the absence of land lines of communication forced all agencies in the theater to turn to the airplane—initially as an afterthought and an emergency last-chance measure. The inherent flexibility of air power permitted it, without adequate preplanning, to meet the exigencies of the various situations. Air transport operations expanded beyond the wildest prediction of 1942—expanded because it was the one agency which could succeed.³⁶

This demonstration that large-scale air supply was practical for delivering military assistance has become the air mobility doctrine of the United States down to the present. Its use in virtually every conflict involving United States troops and in many of the crises where military assistance has been given American allies—witness the Israeli Airlift of 1973—has amply demonstrated its effectiveness. While procedures have been refined and equipment made more efficient, the basic air assistance techniques used on the Hump have remained in operation to the present.³⁷

Notes

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1st SOW Wins Maintenance Award

Hard work, dedication, and initiative—that combination is what edged out competitors and helped the 1st Special Operations Wing (SOW) be selected as the 1990 Daedalian Maintenance Award winner. The unit's accomplishments from October 1989 to September 1990 were recognized with the award.

Nominated by the Air Force Special Operations Command, the 1st SOW (which last won the award in 1970) competed against other Air Force major command nominees. The wing will now represent Air Force at the Department of Defense level for the DOD Phoenix Award.

Colonel Robert H. Stephens, Deputy Commander for Maintenance for the wing, said selection for the award reflects the dedication, initiative, and hard work of the 2,300 people who make up the four maintenance squadrons.

"I'm extremely proud of the performance of the men and women of the 1st SOW maintenance squadrons," Colonel Stephens said. "They have met every challenge they've faced while operating at locations around the world."

The 1st SOW maintenance group includes members of the 834th Aircraft Generation Squadron, 834th Component Repair Squadron, 834th Equipment Maintenance Squadron, the maintenance staff, and the 655th Special Operations Maintenance Squadron based at Eglin AFB, Florida.

"The year was packed with special taskings and contingencies for the 1st SOW maintenance complex," Colonel Stephens said. "The high level intensity of operations throughout the year put us in line for the award. If the award was based on mission alone, we'd win it every year."

Colonel Stephens also said that the maintenance squadrons began the year by supporting a large-scale joint readiness exercise in December 1989. "It was massive. We had an aerial ballet with more than 100 aircraft over the Eglin range."

Operation Just Cause followed on the heels of the exercise with a short two-day recovery period.

Along with the numerous deployments, training missions, and exercises, the maintenance organizations forged ahead with their regular schedule of modifications and systems upgrades to every aircraft assigned to the wing.

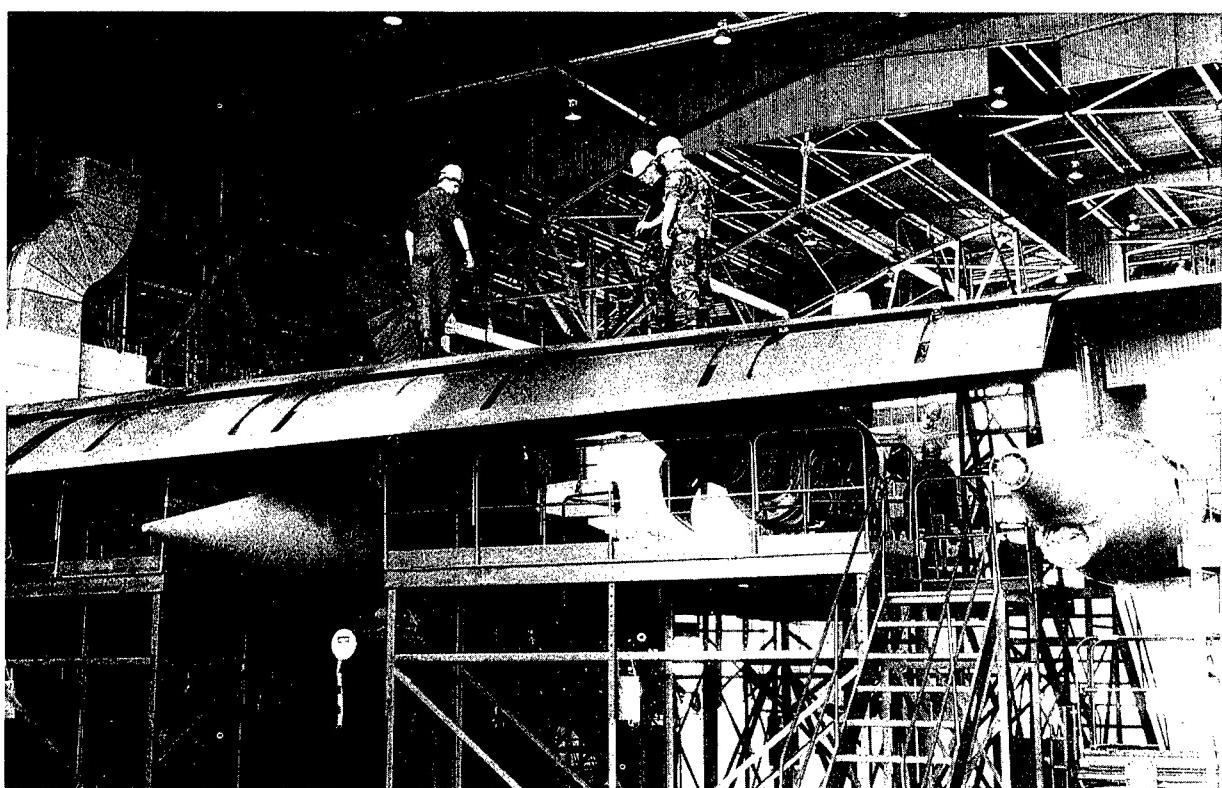
The 1st SOW also was one of the first units sent into Saudi Arabia at the beginning of Operation Desert Shield in August 1990.

Colonel Stephens praised his people for their quick response to taskings for Desert Shield and the 94% mission effectiveness rate during their duty in the desert. Along with an impressive sortie rate, they protected the aircraft from the blistering desert summer by using their ingenuity and common sense. They devised canopies for the aircraft to reduce sand and heat damage, installed flexible plastic shields for helicopter control panels, and wrapped the aircraft guns to keep the sand out.

Overall, Colonel Stephens described his people as outstanding maintenance professionals, deserving of the highest honors for their work.

He said, "These maintainers truly live up to the 1st SOW motto—'Any time, any place.'"

AF Special Operations Command News Release, 26 March 1991



AFSOC Intermediate Level Maintenance on MC-130, Hurlburt Field, Florida.



Operation HOMECOMING: MAC's Finest Hour

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Cicero once said, ‘The fangs of freedom bite not so deep as when that freedom is lost.’ I have known the bite of freedom lost. I have experienced the tremendous joy of freedom regained.

Colonel James E. Sehorn (Ex-POW)

The status and condition of Americans held captive in Southeast Asia concerned the United States government from the time the Viet Cong captured Special Forces Captain Floyd J. Thompson on 26 March 1964 until his release almost nine years later.¹ Four-and-a-half months after Thompson’s capture, Navy Lieutenant Everett Alvarez, Jr., became the first prisoner of North Vietnam when antiaircraft fire destroyed his A-4 “Skyhawk” during a strafing run on a torpedo boat base at Hon Gay near Haiphong on 5 August.² Before the Paris Peace Accords ended America’s involvement in the Vietnam War in 1973, hundreds more would join Thompson and Alvarez in Communist prison camps. After the war, 600 US military and civilian and third-country nationals returned from imprisonment in North Vietnam, South Vietnam, Laos, and China. Most of the captives were Air Force and Navy pilots. The Hanoi government admitted that 55 Americans died in prison, but the fate of the more than 1,300 men listed as missing in action is still unknown.³

Long before the 28 January 1973 *New York Times* headline proclaimed, “VIETNAM PEACE PACTS SIGNED; AMERICA’S LONGEST WAR HALTS,” USAF officials planned for the day when the American prisoners in Southeast Asia would return to freedom. As early as December 1968, the Military Airlift Command (MAC) had published an EGRESS RECAP Plan for the repatriation of the American prisoners.⁴ The command used this plan, with some alterations, for the 1973 operation. The code name for the operation remained EGRESS RECAP until 19 January 1973, when Defense Secretary Eliot L. Richardson changed the title to the more appropriate Operation HOMECOMING.⁵ So after years of planning, MAC was ready when Operation HOMECOMING began.

Since the North Vietnamese released the American prisoners at Hanoi, Admiral Noel Gaylor, the Commander in Chief, Pacific Command (CINPAC), who was in charge in the theater, also became the commander for Operation HOMECOMING. On 6 December 1972, Admiral Gaylor designated Clark AB, Republic of the Philippines, as the Joint Central Processing Center, meaning that this would be the repatriates’ first stop on their journey from captivity to freedom. On 28 January 1973, he confirmed that MAC C-141s would return prisoners from North Vietnam, while Pacific Air Forces (PACAF) C-9s would airlift men who had been held in South Vietnam and other areas.⁶

The MAC ground support element at Clark AB went on eight-hour alert status on 8 February in expectation of the pending release. By then MAC had positioned 13 “dedicated” C-141s at Clark.⁷ Because of the lack of information on the prisoners’ physical condition, officials planned to place a seat and a litter aboard the aircraft for each returnee. The North Vietnamese soon informed negotiators, however, that all the captives were in “good physical condition” and would not need

litters. To avoid political complications, Admiral Gaylor asked MAC to reduce the number of litters on the C-141s. Each aircraft, therefore, had only 12 litters on board. He also requested that MAC place red crosses on the tails of the C-141s designating them as medical evacuation aircraft.⁸

The North Vietnamese, on 10 February, provided the names of the first group of prisoners scheduled for release two days later. This initial increment included 18 military and 9 civilians held in South Vietnam and 115 from North Vietnam prisons.⁹ The primary MAC crews at Clark were now on three-hour alert status. The following day, 11 February, MAC received notice of the pickup times; however, a few hours later word came that inclement weather in the Hanoi area had delayed these times by two hours. Later that evening Operation HOMECOMING officially began.¹⁰

Appropriately, at dawn on Lincoln’s Birthday 1973, the first Operation HOMECOMING aircraft took off from Clark AB. The C-130 from PACAF’s 374th Tactical Airlift Wing carried an 18-person “reception support team,” including a team chief, a flight surgeon, five medical technicians, three photographers, two public information officers, one airlift control officer, a four-person airlift control element (ALCE), and two interpreters.¹¹ A jeep equipped with a high frequency radio that was part of an intricate communications system was also aboard the aircraft.¹² The PACAF C-130 was airborne three hours before the C-141s were scheduled to take off. Chief Master Sergeant William R. Roberts, who was the loadmaster on one of the flights, said the extended lead time gave the negotiating team time to take care of any paperwork or details for the release and allowed the communications and airlift control element to be ready before the MAC C-141s arrived to pick up the newly freed prisoners. But the primary reason for the extended lead time was: “We wanted to have time to get another airplane in there if that one broke. We did not want the guys to have to wait another day just because we broke the airplane.”¹³ Some of the C-130s also carried Red Cross supplies for the remaining prisoners.¹⁴

Shortly after the PACAF “Hercules” was airborne, an Aerospace Rescue and Recovery Service (ARRS) HC-130 headed for a spot just off the coast of North Vietnam. Acting as an orbiting radio relay platform, this “talking bird” and the team on the ground in Hanoi completed a communications network that stretched from the Twenty-Second Air Force command post at Travis AFB, through Hawaii and the Philippines, to the HC-130, to the jeep on the ground, and then to the MAC C-141s flying to and from Hanoi. This state-of-the-art communications system allowed Major General John F. Gonge, Twenty-Second Air Force Commander, to maintain constant voice contact with the Starlifters’ crews from the time they started their engines at Clark AB until they landed there again with their precious cargo. General Gonge recalled: “I had complete control of everything, when they started their engines and all that. We took everybody else off that system so we could have command and control. It worked absolutely marvelously; I could talk to them like I am

talking with you.”¹⁵ The HC-130 also provided air rescue coverage for the Phase I flights.¹⁶

The C-141s at Clark sat poised and ready. General Gonge had sent Colonel Robert Sherman, the Twenty-Second Air Force’s chief pilot, to Clark and instructed him, “You go out there and make sure not one screw is left unscrewed.”¹⁷ There were extra crews and extra airplanes in place. As General Gonge noted later: “I think if a starter button would have stuck on those first two airplanes, the pilot would have gotten out and turned it by hand in order to get to go. Because everybody wanted to be a part of that mission.”¹⁸ As expected, the C-141s took off on time. The first increment included three primary aircraft that made the trip to Hanoi, one airborne spare that circled over South Vietnam until the last airplane load of repatriates were in the air, and a ground spare at Clark AB. Colonel Harriet Phillips, a flight nurse, remembered her disappointment in not directly participating in the first release after she and the other crewmembers spent hours in anticipation aboard the airborne spare.¹⁹

Major James E. Marrott, 63d Military Airlift Wing, Norton AFB, California, and pilot of the first C-141 into Hanoi, described the 2½-hour flight from Clark AB to Gia Lam as uneventful until they reached the coast of North Vietnam. There they encountered solid overcast from 12,000 feet down to about 900 feet. Although they expected a rough runway, they landed without problems.²⁰ For subsequent missions, MAC instituted a “harbor pilot” policy: after an aircraft commander had flown into Hanoi, he served as copilot on succeeding flights. This technique provided each mission with a crewmember familiar with Gia Lam’s location and local radio procedures.²¹

Meanwhile, the Americans held in Hanoi had arisen early that morning, too. After suffering innumerable disappointments, the 115 men scheduled for release on 12 February experienced a mixture of excitement, anticipation, and apprehension.²² “We needed no bands or billowing banners as the men, the lame and the halt in front, formed up,” Navy Captain Jeremiah A. Denton, Jr., recalled. “And then it began; heads up, chests out, some men staggering a bit, we marched in cadence to the buses, then were driven, subdued in the solemnity of our thoughts, almost hypnotized, through streets lined with throngs of silent people to Gia Lam airport, three miles from Hanoi.”²³ To heighten the tension, when the prisoners reached the airport, they had to sit for hours waiting for their scheduled release time.²⁴

Shortly after noon, the C-141s arrived at Gia Lam Airport. “While sitting in buses on the ramp, we saw three C-141s make a circle,” Air Force Colonel Robinson Risner, Senior Ranking Officer of the 4th POW Wing, recounted. “It was so beautiful. We couldn’t believe a bird that big could be so graceful. Along the sides of the fuselage was painted UNITED STATES AIR FORCE with a big red cross on the tail.”²⁵ After the airplanes had landed and taxied near the air terminal, the prisoners exited from the buses. The International Control Commission team and their North Vietnamese counterparts sat at a table under a red tent in front of the terminal. The prisoners formed columns of twos in the order of capture date. Lieutenant Alvarez was first in line, Captain Denton was number 13, and Colonel Risner number 27. One observer remembered the North Vietnamese announcer told the prisoners in perfect English, “As I call your name, step forward and go home.”²⁶ “As he called each name, we stepped forward to shake hands with the American representative. In our case it was Air Force Colonel Al Lynn, an old friend of mine,” Colonel Risner related. “I was overwhelmed with emotion. The moment I touched his hand, I knew I was free. I couldn’t restrain

myself. We threw our arms around each other and embraced in front of all the people.”²⁷

After the prisoners crossed an imaginary line that divided the table between the American and North Vietnamese team, they were free. Although it was not part of the Operation HOMECOMING plan, the C-130 crewmembers who were standing nearby watching the proceedings stepped forward and escorted the repatriates to the waiting C-141s. “Our people would escort a person to the aircraft,” recalled Captain Kenneth E. Green, “and then they would actually run back to the line to get another one to escort them back. Except for two or three litter patients, every single person, even the ones with broken bones, no matter how their bones had healed, walked to the aircraft under their own steam.”²⁸

On later flights, the C-130 crewmembers on the ground at Gia Lam continued to serve as escorts. CMSgt Arthur West, a C-130 flight engineer on one of the later missions, remembered, “If the prisoner talked, I could talk; but if he started to choke, I couldn’t talk either, it was so emotional.” Chief West recounted some of the comments of the newly-freed Americans, including: “Free at last!” “That [C-141] was the most beautiful bird I’ve ever seen.” “I have chills running all through my body—you will just never know how it feels.”²⁹

Captain Green, Commander of the Aeromedical Evaluation Management Branch at Clark AB, had ridden to Gia Lam on the C-130 for the first HOMECOMING mission. He remembered that the apparently good condition of the men after so many years of internment amazed him. Captain Green and other medical planners had been unable to determine the medical condition of the prisoners prior to their release, so “there was a tremendous amount of planning on what medical equipment and which medical specialties would be needed to bring them home. So when we reached Gia Lam, we knew that if they would give us our men, we could bring them back, no matter what their condition. However, much to our surprise, they came out by themselves. They stood tall and they marched. It was wonderful to see them. They were proud to be Americans.”³⁰

When the repatriates reached the waiting C-141s, they found that the crews at Clark had spruced up the normally austere interior of the aircraft. There were magazines, including *Playboy*, available and copies of *Stars and Stripes* on every seat. The medical crews had brought electric razors, after-shave lotion, and cloth hand towels. Nurses and medical technicians greeted the men and showed them to their seats, but they were too excited to sit down. The nurse conducting the pre-takeoff briefing could not get the men’s attention, so she asked Captain Green, “What shall I do?” He replied, “Just tell them to hold on to something because we are going home.”³¹

“We had always said we wouldn’t really trust the Vietnamese until our wheels had left the ground. Our plane taxied out and waited for clearance,” Colonel Risner related. “Then the pilot threw the coal to it. Everyone was tense and unmoving . . . As soon as we felt the vibrations stop and knew the aircraft had lifted from the ground, a wild cheer swept the airplane. Everyone shouted, clapped their hands and laughed.”³² Major Marrott recounted, “We started our take-off roll, and over the headset noise and noise of the engines I could hear a tremendous cheer from the back of the airplane as we broke ground.”³³

After years of dreaming of thick, juicy steaks, the men were starving with anticipation. Unfortunately, dieticians at Clark AB, concerned that years of deprivation had affected the men’s ability to digest such fare, had recommended Sustacal, a liquid high-protein dietary supplement. “The first thing the men wanted when they got on board the airplane was something to eat,”



Captain Green recalled. "It was rather embarrassing to say all we have for you is Sustacal."³⁴ The repatriates obviously wanted more substantial food. Colonel Risner explained to one of the attending physicians that in recent months the North Vietnamese had given the captives "a lot of pig fat and grease" to get them ready for release. The doctor radioed ahead to Clark AB to change the diet there to a normal one.³⁵ There would be plenty of steaks, lobster, green salads, and cold milk and ice cream awaiting them at Clark. Although the dieticians did not change their recommended in-flight menu, by the second release the medical crewmembers took matters into their own hands. They smuggled a chocolate cake, salami, cheese and crackers, and other goodies on board.³⁶

The repatriates passed the next 2½ hours laughing and talking with the aircrew and the nurses. The flight crew relayed a request that Captain Denton, on the first flight, and Colonel Risner, on the second, say a few words upon their arrival at Clark AB.³⁷ Although some newspapers accused the military officials of prompting the returnees on what to say, both these men stated that this was not true. Colonel Risner remarked, "Absolutely no one had suggested anything to say or not to say, but we were not unprepared for being released. We had been making plans for years."³⁸ Chief West, who had escorted the men to the C-141, commented, "They told me the same things that went into the papers; it wasn't something the government planted into their minds to say."³⁹ Colonel Green confirmed, "They absolutely were not prompted in any manner."⁴⁰

Since the North Vietnamese had censored the news reaching their captives, the prisoners had been inundated with anti-war news from America and prevented from hearing any words of encouragement or support. Thus, they were unsure of the type of reception they would receive at Clark AB upon their arrival. Captain Green described the scene: "When the door opened, there was an ocean of people out there."⁴¹ Colonel Risner remarked that the crowd's response had overwhelmed him: "The sincerity and feelings in the welcome were beyond anything we had imagined." Thousands of civilians and military personnel jammed the ramp and lined the streets on the way to the hospital. "Some were crying, many waving flags; they were just like our family."⁴²

When the first HOMECOMING C-141 landed at Clark AB, Captain Denton, as the senior man aboard, exited the aircraft first and walked down the specially rolled-out red carpet. After saluting Admiral Gaylor and shaking hands with him and 13th Air Force Commander Lieutenant General William G. Moore, Captain Denton stepped to the microphone. Television cameras and sound equipment carried his words around the world: "We are honored to have had the opportunity to serve our country

under difficult circumstances. We are profoundly grateful to our commander in chief and to our nation for this day. God Bless America!"⁴³ For this first group, their long ordeal was over.⁴⁴

MAC was not the only organization to airlift repatriates during this first phase of Operation HOMECOMING. Admiral Gaylor had already announced that the PACAF 9th Aeromedical Evacuation Group would return the newly-freed Americans from release points other than North Vietnam. In all, the Democratic Republic of Vietnam, the People's Revolutionary Government, the Laotian Patriotic Front, and the People's Republic of China released 600 prisoners, including 566 American military, 25 American civilians, and 9 third-country nationals. One American civilian, one Canadian, and one South Korean declined airlift. Of the remaining 597, MAC C-141s airlifted 567 repatriates on 17 missions from Gia Lam to Clark AB during Phase I of Operation HOMECOMING. PACAF C-9s airlifted the balance of 30 people on two missions from Saigon and two from Hong Kong.⁴⁵

Phase II flights carried the men from Clark AB to one of five centralized dispatch points in the United States: Travis AFB, California; Kelly AFB, Texas; Scott AFB, Illinois; Maxwell AFB, Alabama; and Andrews AFB, Maryland. MAC C-9s were standing by to carry the repatriates on to the appropriate hospital. Officials had determined earlier that returnees would be more comfortable in familiar surroundings, so each man convalesced near his home in a hospital affiliated with his branch of service. Thirty-one service hospitals throughout the United States served as recovery centers during Operation HOMECOMING.

If one were to judge Operation HOMECOMING only by numbers of missions or numbers of passengers, it would be deemed rather insignificant. However, these 600 passengers held a special place in the hearts of Americans and millions of people around the world watched MAC return them home. The command's planning and execution were impeccable. On 18 June 1973, the Department of Defense recognized Operation HOMECOMING as the outstanding aerial feat of 1973 when Air Force Chief of Staff General George S. Brown presented the Mackay Trophy to General Gonge, who represented the thousand of members of MAC who made the operation so successful. For many Americans, this was the Military Airlift Command's finest hour.

It was just another routine mission for MAC, done superbly and outstandingly well, as usual.

Dr Roger E. Shields⁴⁶

Summary of Flights

MAC C-141s

Date	Acft #	Passengers	Route
12 Feb	60177	40	Gia Lam to Clark AB
	50243	40	for all C-141 flights
	50236	36	
18 Feb	40641	20	
4 Mar	60177	40	
	67944	40	
	50243	28	
5 Mar	60161	34	
14 Mar	70007	40	
	40641	40	
	67944	28	
16 Mar	50280	32	
27 Mar	70001	32	
28 Mar	*70007	10	
	70031	40	
29 Mar	50280	40	
	50238	27	
Total		(17)567	

PACAF C-9s

Date	Acft #	Passengers	Route
12 Feb	10878	26	Tan Son Nhut to Clark AB
12 Mar	n/a	1	Hong Kong to Clark AB
15 Mar	n/a	2	Hong Kong to Clark AB
1 Apr	n/a	1	Tan Son Nhut to Clark AB
Total		(4)30	

Totals: 21 missions airlifted 597 passengers.

Note: Of the 600 released, 1 Canadian, 1 South Korean, and 1 American released in South Vietnam declined airlift.

Notes

¹Hubbell, John G. *P.O.W.* (New York: Reader's Digest Press, 1976), pp. 383-393, details Thompson's capture and treatment.

²Ibid., pp. 3-34.

³Rowan, Stephen A. *They Wouldn't Let Us Die* (Middle Village, NY: Jonathan David Publishers, 1973), pp. 28-29.

⁴Until 1968 the name for the prospective operation was SENTINEL ECHO.

⁵Msg (U), AFMPC to AIG, et al, "Change of Nickname EGRESS RECAP to HOMECOMING," 201845Z Jan 73, quoted a message from the CSAF on the previous day.

⁶Rprt (FOUO), MAC, "HOMECOMING, After Action Report," July 1973, pp. 4-5.

⁷Dedicated aircraft are those reserved for a specific mission. Maintenance personnel had not only inspected and serviced these C-141s to make sure they were in superb mechanical condition, but also had cleaned and polished them in preparation for their special mission.

⁸Rprt (FOUO), MAC, "HOMECOMING, After Action Report," July 1973, p. 5. This is the only time that C-141s have had red crosses on their tails; the C-9, however, still carries this designation as a medical airlift aircraft.

⁹The North Vietnamese actually released 116 in this first group.

¹⁰Rprt (FOUO), MAC, "HOMECOMING, After Action Report," July 1973, p. 6. At 1145Z or 2045 local time on 11 February, Headquarters MAC transmitted the message officially executing Operation HOMECOMING.

¹¹Article, "U.S. Units in Philippines Poised for P.O.W. Airlift," *New York Times*, 11 February 1973.

¹²Intvw, Dr C. F. Cross, MAC Hist, with CMSgt W. R. Roberts, MAC/DOTT, 2 May 1990. Aircraft and crews from the 374th TAW stationed at Ching Chuan Kang (CCK) AB, Taiwan, were on temporary duty (TDY) to Clark specifically to support Operation HOMECOMING.

¹³Intvw, Cross with CMSgt Roberts.

¹⁴Intvw, Dr C. F. Cross, MAC Hist, with CMSgt A. West, MAC/DOTT, 2 May 1990.

¹⁵Intvw, Dr C. F. Cross, MAC Hist, with Lt Gen J. F. Gonge, USAF (Ret), 9 March 1990.

¹⁶Intvw, Dr C. F. Cross, MAC Hist, with SMSgt Fred H. Scantling, MAC/XPMX, 17 April 1990.

¹⁷Intvw, Cross with Lt Gen Gonge.

¹⁸Ibid.

¹⁹Intvw, Dr C. F. Cross, Hist, with Col H. Phillips, 27 June 1990.

²⁰Hist, MAC, 63d MAW, January-March 1973, p. 37.

²¹Hist, MAC, 1973, p. 67.

²²The North Vietnamese added Navy Commander Bryan D. Woods to the list, at United States request, because his mother was seriously ill.

²³Jeremiah A. Denton, Jr., with Ed Brandt, *When Hell was in Session* (New York: Readers Digest Press, 1976), p. 234. Denton, a U.S. Navy lieutenant commander when captured, was promoted to captain while in captivity and later to rear admiral.

²⁴Ibid; Robinson Risner, *The Passing of the Night* (New York: Random House, 1974), p. 245.

²⁵Risner, *The Passing of the Night*, p. 245; for more information on Col Risner see John L. Frisbee, ed, *Makers of the United States Air Force* (Washington DC: Office of Air Force History, 1987).

²⁶Intvw, Dr C. F. Cross, MAC Hist, with Col K. E. Green, USAF (Ret), 19 June 1990.

²⁷Risner, *The Passing of the Night*, p. 245.

²⁸Intvw, Cross with Col Green.

²⁹Intvw, Cross with CMSgt West.

³⁰Intvw, Cross with Col Green.

³¹Ibid.

³²Risner, *The Passing of the Night*, p. 246.

³³Hist, 63d MAW (MAC), January-March 1973, p. 37.

³⁴Intvw, Cross with Col Green.

³⁵Risner, *The Passing of the Night*, pp. 246-247.

³⁶Intvw, Cross with Col Green.

³⁷Throughout the operation the practice of the senior officer aboard each flight addressing the crowd at each stop continued.

³⁸Risner, *The Passing of the Night*, p. 248.

³⁹Intvw, Cross with CMSgt West.

⁴⁰Intvw, Cross with Col Green.

⁴¹Intvw, Cross with Col Green.

⁴²Risner, *The Passing of the Night*, p. 249.

⁴³Denton, *When Hell was in Session*, p. 235.

⁴⁴Three more increments on 4 March, 14-16 March, and 27-29 March and two special releases on 18 February and 5 March followed this initial event.

⁴⁵Hist, 13 Air Force, *History of Operation HOMECOMING*, pp. vii-5-vii-10; reprt, 375 AAW, "MAC Aeromedical Evacuation Final Report Operation HOMECOMING," pp. 21-70; rprt (FOUO), MAC, "HOMECOMING, After Action Report," July 1973, pp. 12-16.

⁴⁶Quoted by Col K. E. Green. Dr Shields was the Chairman of the Department of Defense Prisoner of War/Missing in Action Task Force.



Most Significant Article Award

The Editorial Advisory Board has selected "Fighter Design From the Soviet Perspective (Part I)" by Richard D. Ward as the most significant article in the Fall 1990 issue of the *Air Force Journal of Logistics*.



People Power and Pacific Airlift

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Throughout the month of February and on into March 1986, several Military Airlift Command (MAC) aircraft in or transiting the Philippines, Guam, and Hawaii, participated in some way with the election or transportation of the fallen Filipino leader—Ferdinand Marcos. MAC participation in Corazon Aquino's **people power** exchange ranged from distinguished visitor travel to the actual Marcos extraction. MAC forces in the Pacific once again pointed out the importance of the airlift role in the midst of rapidly changing international events.

The United States Congressional delegation which observed the elections, headed by Senator Richard G. Lugar, Chairman of the Senate Foreign Relations Committee, arrived in Manila on 4 February via a MAC VC-135 from Andrews AFB, Maryland. Traveling with Senator Lugar were four Senators, five House members, a White House aide, and ten others with election monitoring experience. The 834th Airlift Division's (ALD) 374th Tactical Airlift Wing (TAW) provided C-12F airlift support on 6 February for the team's in-country movements to Laoag, Ilocos Norte; Cebu City, Cebu; Tacloban, Leyte; and Davao City, Mindanao. The following day, MAC HH-3 helicopters from the 31st Aerospace Rescue and Recovery Squadron (ARRS) at Clark Air Base flew teams to Tarlac and Batangas within a few miles of the base.¹

On Sunday, 23 February 1986, unarmed Filipinos massed in front of government tanks. The tanks stopped and some of the soldiers (supposedly, the enemy) embraced the people. These people wanted to be masters of their territory and national destiny. They wanted Ferdinand Marcos out and Corazon Aquino in.²

This was not a one-time occurrence. Throughout the first five years of the 1980s, the people of the Republic of the Philippines became disenchanted with the leadership and began to speak out more and more. Although an adroit politician, President Marcos believed he could monopolize power if his actions conformed or appeared to conform to the general, deep-rooted Philippine political value system. Despite the President's attempts to cater to such beliefs, he was unable to budge the social disparities so evident throughout his country. The execution and coverup of torture and assassinations—such as that of former Senator Benigno "Ninoy" Aquino, Jr., in 1983—became the proverbial straw which broke the camel's back.³

Marcos told the Filipinos that Aquino's murder was a communist plot, while civilian witnesses stated the killer was a man in uniform. On 24 October 1984, an independent investigative panel implicated General Fabian Ver, Armed Forces Chief of Staff, in the plot to kill Aquino. General Ver immediately began a leave of absence and his deputy, Lieutenant General Fidel Ramos, assumed this position. On 22 February 1985, General Ver, 24 members of the military, and 1 Philippine businessman went on trial for the Aquino murder.⁴



People power campaign by Mrs Aquino (center) prior to the elections in the Philippines, January 1986.

A prime indicator of Marcos's belief in his invulnerability was his unrealistic determination to remain in power despite his failure to legitimately win the 7 February 1986 national election from Corazon Aquino, the widow of the slain opposition leader.⁵

While Sunday in the Philippines, it was Saturday in Hawaii when the 834 ALD Commander initiated the actions which implemented a foreign policy decision made at the highest levels of the US Government to airlift the Marcos entourage out of the Philippines.⁶ At the same time, the staff of the 374 TAW at Clark Air Base began planning for potential MAC involvement in the evacuation of President Marcos, his family, and close associates from Malacanang Palace in Manila. They doubled the squadron standby crew requirement to two aircrews and placed them on 24-hour-a-day recall. The 31 ARRS also increased its alert crew posture.⁷

By Monday, Hawaiian time, several events unfolded. Knowing the volatile political climate, the 834th staff felt it best that an on-scene commander make the decisions concerning airlift into and out of the Philippines. The 374 TAW Commander and senior MAC officer at Clark Air Base assumed this role.⁸

By Tuesday, 25 February, with the Marcos political regime deteriorating rapidly, the senior US military leadership in the Philippines met and began planning the evacuation of the Marcos family from Malacanang Palace. Initial plans called for HH-3 helicopters to ferry passengers from a Pasig River park site to Clark AB. A C-130 would act as the airborne command, control, and communication line (ABCCC) between the helicopters on the park grounds, the American Embassy in Manila, and the Command Post at Clark. Following this meeting, the MAC on-scene commander issued orders to have all MAC aircraft ready by 2100 hours for probable extraction missions.⁹

At about the same time and upon the suggestion of the 834th Director of Transportation, the staff of the United States Commander-in-Chief-Pacific directed the termination of all US military passenger commercial air transportation into the Manila

International Airport. The problems surrounding the diversion of these travelers were enormous. The 834th Director of Transportation volunteered his people for interception of passengers already traveling. There were two areas which required detailed management. People moving through mid-Pacific on commercial missions were stopped at the Honolulu International Airport and diverted to C-141 channel missions which departed Hickam and landed at Clark. People on the northern commercial route were intercepted at Narita International Airport, Japan, transferred to Yokota AB, and moved on available MAC airlift to the Philippines. The mid-Pacific transfers in Hawaii went smoothly; however, in Japan there were no quarters available at Yokota Air Base, nor any other lodgings in the area, not even in downtown Tokyo. Every one of the 70 people stopped and bussed to Yokota sat in the passenger terminal until assigned a seat on an available aircraft. Fortunately, none spent more than one night; virtually no one complained of the inconvenience.¹⁰

One hour after Ferdinand Marcos took the oath of office as President, he requested that the US Ambassador to the Philippines find out if the US would provide them with security in flying out of the palace. Marcos previously talked of retirement in Ilocos Norte, his home province, but these plans were discouraged by his family. As the MAC Mission Commander, this wing commander ensured the aircraft moved safely from Clark to the Presidential Palace.¹¹

The first two helicopters departed Clark on 24 February at 1950 for the US Embassy. The C-130 ABCCC launched at 2010 and the last two helicopters departed at 2020. The lead aircraft commander received word the passengers awaited him in the park across the Pasig River from Malacanang Palace. Upon their arrival, the aircrews noted guards; however, no Presidential party was in sight. The helicopters waited on the park grounds 25 minutes before anyone approached them. They could only see a few people amongst the trees lined along the wall.¹² When the Presidential party finally arrived, the helicopters moved President Marcos, his wife, his children, and his grandchildren to Clark Air Base. In total, there were seven helicopter loads.¹³

While the dignitaries slept at Clark AB, the MAC Commander planned the departure for Guam early the next day. At 0510, Marcos, his family, and two Filipino doctors who served as attendants for Marcos, departed on a 374 TAW C-9 (tail number 22583) for Guam. A C-141 (tail number 38088)

with the remainder of the Marcos staff departed ten minutes later.¹⁴

Marcos liked the C-9 aircraft and was comfortable since only his immediate family accompanied him. The 9th Air Evacuation Squadron at Clark provided a full medical team including a doctor; however, Marcos never requested their assistance.¹⁵

The C-9 was the first arrival at Andersen AFB, Guam. It landed at 1025 on 25 February; the C-141 arrived at 1040. There was some delay in deplaning the Marcos party to accommodate their reception by the Lieutenant Governor of Guam, Eduard D. Rejas, and the two senior military officers on the island. Immediately after the arrival ceremony, the Marcoses and other principal members of the entourage departed for the distinguished visitors quarters. The remainder of the party slept in officers quarters or in the base recreation center awaiting further transportation.¹⁶

The MAC on-scene Commander, who accompanied the entourage to Hawaii, anticipated an eight-hour ground time before any onward movement and determined that all passengers would travel in one C-141 configured for air evacuation. Since Mrs Marcos expressed severe reservations about riding in an aircraft without windows, one of her sons-in-law was shown the proposed aircraft configuration, and he in turn, convinced her that she would indeed have a window.¹⁷

The aircraft configuration included six litters. The 605th Military Airlift Support Squadron (MASS) transportation staff installed privacy curtains around the rear of the compartment which added additional privacy for the Marcoses and their immediate family when using the litters. Another set of privacy curtains separated the litters from the baggage pallets which occupied the aft tail section of the C-141.¹⁸ The aircraft departed at 2354.¹⁹

By Wednesday, 26 February 1986, the 619th MASS at Hickam AFB, Hawaii, took over the MAC reins when they learned the C-141 arrival time was 1050. There were some minor problems with the deplaning. The original plan called for moving the baggage pallet after the Marcos party had departed the aircraft. Word was never passed to the 619th that there were two baggage pallets; everyone involved assumed there would be only one. This required calling for an extra forklift and pallet dolly. Just after the aircraft landed, someone asked if the passengers could deplane through the back of the aircraft. The US Customs and Agriculture people refused this request. Following these



Mr and Mrs Ferdinand E. Marcos talk to the press from the lanai of the Hickam Officers Club on 28 February 1986.

delays, the party finally exited through the front crew door and were met by the then Governor of Hawaii, George Ariyoshi, Mrs Ariyoshi, several military dignitaries, and of course, the press. Their stay was planned to be short in duration, with base officials reporting that departure would be within 72 hours.²⁰

While the Marcos people occupied most of the officers quarters on Hickam AFB, the 619th Command Post placed aircrews on alert and readied aircraft to fly Marcos anywhere he wanted to go. At one time there were a total of 14 crews on alert who were prepared for takeoff within three hours, with four aircraft dedicated to this alert as well. Panama was one option considered in attempts to find the Marcos family a permanent home, and plans to move them there during mid-March proceeded to within two hours of departure. Members of the Marcos party packed; the 619th collected the luggage; and transportation to the aircraft was on standby when the Government of Panama refused the entourage asylum. When this occurred, the aircraft and crews were released.²¹

The alert was not the only effect the Marcos stay at Hickam had on MAC aircrew members. The night of the 25th and the morning of the 26th of February, the 15th Air Base Wing cleared out all the bachelor officers quarters, including several crews in crew rest. These quarters became living space for the Marcos party. Fortunately, this sleep interruption only caused one delay to an air evacuation medical crew. For the remainder of February and March, aircrews and visitors to Hickam either stayed in Waikiki hotels or used enlisted quarters.²²

Slowly, the Marcos party moved from Hickam into the surrounding Hawaiian communities. Marcos and his wife became permanent visitors in Hawaii when they departed the base on 24 March and settled into a beachfront house four miles outside Honolulu.²³

Marcos departed his country for the final time. The peaceful extraction of Marcos was directly attributable to MAC's Pacific team. Despite the usual amount of communication and coordination problems, they worked safely and professionally in concert with the needs of the rapidly changing political circumstances in the Philippines. The United States benefitted by having a MAC on-scene commander involved in the operation from beginning to end. His expertise and ability to act on a moment's notice ensured a smooth operation. The airlift required the coordination and cooperation of many agencies from aircrews to support units; MAC was there, fulfilling its mission. The 834th Airlift Division, along with all the other MAC units assigned to or in the Pacific those two months, worked in harmony and peacefully evacuated the man the majority of Filipinos no longer wanted as their President.²⁴

According to General Duane H. Cassidy, who was MAC Commander-in-Chief, "In a fluctuating and demanding international environment, most recently highlighted by events in the Philippines, I'm pleased MAC's in the forefront supporting foreign policy decisions." Additionally, he cited "the exemplary performance of various units, specifically the 834 ALD, 374 TAW, 31 ARRS, 9th Aeromedical Evacuation Squadron, and the 57th Military Airlift Squadron during the Marcos airlift. Accolades of flexibility, courage, consummate professional skill, and sterling performance under adverse circumstances" were but a few of the comments he had received. "We are justifiably proud of their achievements," he continued. "Our men and women in all fields are doing a great job for our country. I am proud of each of them. Keep up the good work."²⁵

Notes

¹History of the 374 TAW, January-June 1986, p. 14.

²Tiff, Susan. "Rebelling against Marcos," *Time*, 3 March 1986, p. 5.

³"U. S. Mixed Diplomacy, Pressure in the Philippines," *Honolulu Advertiser*, 3 January 1986, p. B-1.

⁴Ibid.

⁵"The Philippines: A Time of Hope and Danger," *National Geographic*, July 1986, pp. 76-117.

⁶Interview, 834 ALD Historian with the 834 ALD Director of Operations, 27 February 1986.

⁷Interview with 834 ALD Historian and the Commander, Detachment 3, Twenty-Third Air Force, 28 February 1987.

⁸Interview, Director of Operations.

⁹Interview, 374th Historian with the Commander of the 21st Tactical Airlift Squadron, 3 March 1986. Interview, 3d Tactical Fighter Wing Historian with 31 ARRS Commander, 28 March 1986.

¹⁰Interview, 834 ALD Historian with the 834 ALD Director of Transportation, 27 February 1986.

¹¹Debrief of MAC Mission Commander, 374 TAW, Clark AB, Philippines, concerning flight which brought the Marcos party out of the Philippines, 26 February 1986.

¹²Interview, Commander 33 ARRS.

¹³Debrief, mission commander.

¹⁴Ibid.

¹⁵Ibid.

¹⁶Interview, 605th Headquarters Section Commander with the 605th Military Airlift Support Squadron (MASS) Commander, 3 March 1986.

¹⁷Debrief, mission commander.

¹⁸Debrief, mission commander.

¹⁹Interview, 605 MASS Commander.

²⁰Interview, 834 ALD Historian with the Commander 619th Military Airlift Support Squadron (MASS), 28 February 1986.

²¹United Press International reports ("Federal Grand Jury Probe," 19 March 1986; and "Marcos Seeks Haven Outside US," 16 March 1986) both reprinted in the *Honolulu Advertiser*.

²²Interview, 619 MASS Commander.

²³Interview, 619 MASS Commander.

²⁴Interview, Director of Operations.

²⁵Message, Commander-in-Chief MAC to all MAC units, Appreciation, 13 March 1986.



SOLE Logistics Symposium

The Society of Logistics Engineers' Silver Anniversary Annual International Logistics Symposium will be held August 27 - 29, 1991, at the Fairmont Hotel, Dallas, Texas. The theme of the symposium is "Logistics Opportunities in the High Tech Era." The keynote speaker will be Mr George D. Hopson, Manager of the Space Station Project Office, Marshall Space Flight Center, Huntsville, Alabama. Technical panels will discuss Software Logistics, Quantitative Methods in Logistics, Concurrent Engineering, Artificial Intelligence and Expert Systems, Management of Logistics Data, Space Logistics, and other interesting topics. For more information, call Patricia Sutherland at SOLE Headquarters (205) 837-1092.



Operation Desert Shield

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Historian

Hq Military Airlift Command

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(Although we touched on MAC's role in Desert Shield in the first two articles (pages 1-8), the following is a more detailed account of their involvement.)

In the summer of 1990 and for many months afterward, world attention focused on events in the Persian Gulf after Iraq invaded the neighboring oil-rich desert sheikdom of Kuwait on 2 August and began a prolonged occupation. Iraq invaded Kuwait on the order of dictator Saddam Hussein, Iraq's president since July 1979, but the real power in the country long before. A ploy to boost Iraq's sagging economy by forcing a rise in the international price of oil, the invasion sparked the consternation and action of many world leaders. Within days of the invasion, the United States began a multifaceted effort to achieve a status quo antebellum. President George Bush molded a loose coalition of nations to oppose Iraq's aggression. The United Nations condemned the act and authorized using force to prevent an Iraqi invasion of Saudi Arabia and to prompt Iraq's withdrawal from Kuwait. At the same time, President Bush began Operation Desert Shield, a massive deployment of several hundred thousand troops and tons of military equipment and supplies to Saudi Arabia and other Gulf states to deter further aggression. The United Nations also initiated a blockade against Iraq with the intent of forcing Hussein to negotiate a settlement to the crisis.

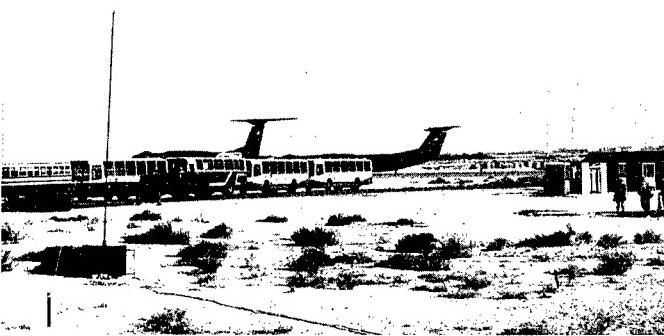
On 7 August 1990, Military Airlift Command aircraft and crews began providing airlift support to elements of the nation's armed forces involved in the Desert Shield deployment. All the command's strategic airlift wings, plus MAC-gained Air Reserve Component units, transported troops and equipment aboard C-141 Starlifters and C-5 Galaxys to the Southwest Asia theater of operations. As a measure of nonactive duty participation, about 4,200 reservists volunteered to fly missions during the first weeks of the contingency. Tactical airlift support

in the theater was provided by MAC C-130 Hercules aircraft and crews deployed from the United States.

Operating under a Department of Defense contract, commercial aircraft, such as DC-10s, L-1011s, and B-747s, moved passengers and cargo into the area. In addition to commercial aircraft chartered to support Desert Shield, Headquarters MAC contracted other civil air carriers to replace the military aircraft that regularly flew scheduled DOD passenger and cargo flights elsewhere in the world. On 17 August 1990, General Hansford T. Johnson, MAC Commander in Chief, activated the first stage of the Civil Reserve Air Fleet (CRAF) to increase the civil airlift available to the armed forces. This was the first time the CRAF had been activated in its 38-year history. The activation required 16 civilian carriers to provide up to 38 aircraft, 21 of them cargo planes, for the strategic deployment.

Subsequently, General Johnson told members of the press corps that with Desert Shield the United States was conducting its "largest sustained airlift ever over a short period of time." He explained that the strategic deployment had greatly taxed the MAC system; all but 5% of the C-5s and 11% of the C-141s were being used to airlift troops and cargo to the region in mid-August. The command needed the remaining strategic transports to meet MAC's mission requirements in other parts of the world.

The principal reasons for the saturation of the airlift system were the distance from the United States to Southwest Asia and the scope of the operation; both greatly expanded the flying hours for MAC aircraft. For example, a C-141 normally averaged four to five hours flight time each day, but Desert Shield requirements, during the first weeks, nearly tripled the flying hours. "It's 7,000 miles by air from the East Coast, and about 10,000 miles from the West Coast," General Johnson said. "Flying time alone is 15 hours one way, in addition to refueling



Aircraft parked on the flight line and contracted buses in the desert of the Arabian Peninsula took deployed airmen, soldiers, and Marines to various locations.



The bright desert sun intensifies the emptiness of a C-5 after it is downloaded in the Middle East. (MAC News Service)

en route and offloading . . . so we're talking at least two days to complete a roundtrip."

General Johnson compared the first few weeks of the deployment to airlifting a small city, stating: "We've moved, in essence, a Midwestern town the size of Lafayette, Indiana, or Jefferson City, Missouri. In addition, we've also moved the equivalent of all their cars, trucks, foodstuffs, stocks, household goods and water supply."

The magnitude of MAC's airlift to the Gulf was unprecedented in the annals of warfare. Only airlift combined the speed and flexibility needed to move tens of thousands of American forces and their equipment quickly to a distant theater of operations. Once the force was in place, a massive sealift in concert with hundreds of additional airlift missions transported the enormous quantities of material needed to sustain the deployed forces.

Desert Shield did not evolve as a typical contingency. For one thing, war did not begin until some 23 weeks after the deployment began, even though in the first days of August hostilities seemed imminent. Hussein's decision not to invade Saudi Arabia gave the United States time to build a multinational coalition. It afforded time to consolidate the troops of many nations into an efficient fighting force, to train for war in a harsh, desert environment, and to assemble by airlift and sealift the vast stockpiles of material needed for a major campaign against a formidable adversary.

By the end of 1990, after many weeks of unprecedeted airlift activity, MAC organic aircraft and contracted commercial carriers had completed more than 9,600 missions which moved some 329,400 passengers and 320,000 short tons of cargo from the continental United States, Europe, and elsewhere to locations in the Persian Gulf region.

The Berlin Airlift, by comparison, had lasted for 463 days. During this much longer period, approximately 2.3 million tons of coal, food, and medical supplies had been moved from European onload points to West Berlin on more than 277,000 missions. Comparing Desert Shield with the Berlin Airlift becomes all the more impressive against the backdrop of the distances flown: the average distance of a Berlin Airlift mission

was approximately 300 miles, while on a typical flight from the United States East Coast to Saudi Arabia, the distance covered was 7,000 miles. Similarly, at the peak of the Vietnam War (May 1967), the Military Airlift Command moved 42,200 tons of cargo in a 30-day period, but during the first 30 days of Desert Shield, MAC airlifted more than 72,000 tons of cargo.

Operation Desert Shield gave the Military Airlift Command an opportunity to demonstrate its commitment to "quality" in a broad and unique way. Recently MAC had adopted Total Quality Management (TQM) as its guiding philosophy of leadership and management. TQM challenged all members of MAC to strive for continual improvement in their daily job performance to better serve the command's many internal and external customers. This commitment to quality was embodied in the vision—"Proud MAC: Support America Can Always Count On"—a statement which proclaimed succinctly the command's proud past and blueprint for the future. General Johnson considered MAC's performance in Desert Shield a fulfillment of the vision. He called it "a perfect example" of how much America and the free world depend upon MAC for their safety and security. Throughout Operation Desert Shield, the men and women of MAC demonstrated their commitment to quality in countless ways. They fine-tuned the airlift system to serve MAC's customers who, on this historic occasion, were the United States armed forces, the multinational force, and the entire free world.

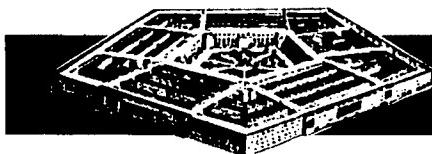
On 29 November 1990, the United Nations Security Council approved Resolution 678 which authorized the use of force ("all necessary means") against Iraq if Hussein failed to withdraw from Kuwait by 15 January 1991. The UN resolution drew a line in the sand, so to speak, by giving Hussein 48 days to leave Kuwait or risk war. Before the early 1991 deadline, the United States and dozens of other governments worked tirelessly, but unsuccessfully, to find a peaceful solution. Hussein still refused to withdraw, and the United States responded by bombing strategic military targets in Baghdad on 16 January 1991 (H-hour was 2400Z). Operation Desert Shield had evolved into a full-scale war and a new element of the operation, Desert Storm, began.



Four airmen watch a Military Airlift Command aircraft take off from a Saudi Arabian air base. (MAC News Service)



As a 12-hour shift comes to an end, deployed members of the 438th Airlift Control Squadron, McGuire AFB, New Jersey, gather to discuss current operations. (MAC News Service)



USAF LOGISTICS POLICY INSIGHT

Equipment Modifications

In conjunction with the ongoing Air Staff reorganization, the Air Force is completely reviewing the process used to categorize, prioritize, and allocate resources to equipment modifications. The current system is overly complicated and causes problems in programming, budgeting, and prioritizing among the user, developer, and supporting commands. Using Total Quality Management techniques, a Process Action Team (PAT) made several recommendations to its General Officer Steering Group (GOSG):

- (1) Establish two temporary classes and a single permanent class of modifications to replace the current five-tiered system.
- (2) Develop a procedure whereby the using MAJCOMs provide HQ AF an integrated modification priority list three times a year as the modification input for the Program Objective Memorandum, Budget Estimate Submission, and President's Budget.
- (3) Establish a single Secretariat/Air Staff programming agency for each equipment category of modifications.
- (4) Use the ongoing AFLC Automated Weapon System Master Plan effort to track the history of modification prioritization and funding in order to document changes.

All these recommendations were initially accepted by the GOSG and are currently being staffed within the Air Staff. When complete, AFR 57-4, *Modification Approval and Management*, will be changed to reflect these recommendations and coordinated with all MAJCOMs. (Policy questions should be directed to Ms Marge Larson, AF/LGMM, DSN 225-1017. Programming/budgeting questions should be directed to Lt Col Jim Lemons, AF/LGSW, DSN 227-1958.)

Software Engineering: Achievable?

We can apply engineering discipline to software. Until we do, we will not be rewarded with the repeatable, cost-effective, manageable software we increasingly need to carry out the Air Force mission.

Lloyd K. Mosemann II
Deputy Assistant Secretary
(Communications, Computers & Logistics)

We are putting this belief into practice and are revising both job descriptions and qualification requirements for our software work force to include an objective definition of software engineering. We are creating a software engineering infrastructure within our work force to foster software engineering awareness and to track its implementation, particularly the improvement of our software engineering processes. We have instituted a policy that ADA, an enabling technology for software engineering, be used in all new and significantly revised Air Force systems. We have enhanced our software engineering curricula at the Air Force Institute of Technology and the Air Force Academy. We are developing, with the Software Engineering Institute, Defense Advanced Research Projects Agency (DARPA), and our own laboratories, solutions to technical obstacles we may encounter. Finally, we are ensuring that software engineering is included as an integral part of a robust systems engineering process.

While we expect some "growing pains," we believe a full Air Force corporate commitment to software engineering will show that effective software engineering is achievable, and achievable now. (Lt Col R. Gross, SAF/AQKS, DSN 225-7987)

Acquisition Policy Update

The AFR 800-Series regulations are being consolidated and rewritten to implement the acquisition policy in the recently revised DODD 5000.1, *Acquisition Management* (signed 23 February 1991), and its companion instruction and manual. The AFR 800-Series will be streamlined, comprehensive regulations which establish the Air Force internal acquisition management responsibilities and processes. AFR 800-1, *Air Force Acquisition System*, will define the Air Force acquisition environment. AFR 800-2, *Air Force Acquisition Management*, will focus on the acquisition manager's responsibilities. AFR 800-3, *Program Acquisition Documentation and Procedures*, will provide the formats and procedures for Air Force unique internal management control reports. Functional "how to" direction will be provided by AFR 800-4, *Acquisition Processes and Procedures*, as well as existing handbooks. (Lt Col Krebs, SAF/AQXA, DSN 223-8221)

AFP 400-77

AFP 400-77, *USAF Wartime Logistics Organization and Decision Making*, describes the current USAF peacetime logistics organization and how it transitions to war. It is set in the context of the unified and specified command structure and identifies the primary decision-making agencies throughout the command structures. In addition, it describes the command relationships and functional responsibilities of each of the logistics organizations. The aim of the pamphlet is to provide, in one cover, a guide to the USAF wartime logistics organization and decision making. It will serve as a desk aid for all ranks at all levels of command. Because of a lengthy printing process, the pamphlet does not necessarily show the latest changes in organization and force structure; however, it will be updated annually to ensure that it remains current. The pamphlet has recently been printed and is available through normal channels. (Wg Cdr Peter Taylor, RAF, AF/LGXX, DSN 225-6798)

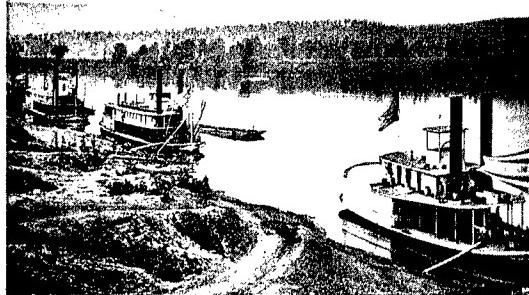
Travel Service

In keeping with DOD policy, the Air Force has begun to competitively procure both official and unofficial travel service from the commercial sector. The Air Force has pursued a three-prong approach. First, a standard Request For Proposal was distributed to AF MAJCOMs in June 1990 for implementation at base level. MAJCOMs were able to implement single base contracts or cluster bases under a single contract until a ceiling of approximately \$50 million total sales is reached. Second, we are testing a joint Army/Air Force regional contracting effort in the north central part of the US known as Defense Travel Region Three. This effort is being led by the Military Traffic Management Command. Lastly, the Air Force is leading a mutual AF-Army contracting effort in Alaska. All three initiatives appear to be progressing well and contracts for the majority of the Air Force, including the joint efforts, should be awarded by the end of this calendar year. (CMSgt Barry R. Smithey, AF/LGTT, DSN 227-9560)

(This paper was written before the Persian Gulf War ended. Perhaps now, after all the logistics statistics are thoroughly reviewed, we can compare Lessons Learned in this War with those of the Civil War. In this way, we can eliminate mistakes if we are faced with yet another war.)

An Analysis of Confederate Logistics on the Outcome of the Civil War: Lessons Learned

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Introduction

The Confederate military logistics experience in the American Civil War provides an excellent opportunity to study in microcosm a logistics system strained to the breaking point. An analysis of the Southern logistics effort, and the resulting effect on the Confederate war-making capability, can validate the emerging principles of logistics management. Even a cursory examination of the Confederacy poses an interesting paradox: how could the agricultural South succeed in providing the manufactured goods and munitions its armies required, and yet fail to feed its men with the basic foodstuffs apparently so abundant within its borders? How could a nation of farmers starve?

If the data history provides is studied for the broad principles, then we can make decisions concerning logistics priorities, organization, and management. A study of the Southern Confederacy is a textbook example of a belligerent that discovered its breaking point in an outmoded approach to logistics management when confronted with what has been termed the first modern, or total, war. (15:112-113)

An examination of Jefferson Davis' influence on military affairs, and the resulting lack of smooth coordination between the Confederate administrative and military chains of command, may at first seem to be a trivial piece of arcane scholarship, until one remembers that the Department of Defense (DOD) Reorganization Act of 1986 was intended to correct just such vagaries within the US military organization. The larger issue lies not in the discovery of the problems, but the nature of the Confederate attempt to resolve them. What factors led to the peculiar circumstances in which the Confederacy found itself, and what procedures could have solved them? How did the Confederates make the critical allocation of resources between combat power and logistics support? How does the application, or lack of application, of effective policies by the Confederate administration, illuminate the problems of integrated logistics management faced by the military today?

Historical Framework

With the secession of the first seven Southern states in early 1861, Southern leaders were faced with the task of creating the administrative apparatus of a country, organizing and raising an army, and holding elections of public officials, all while under threat of invasion. The myriad of details seemed overwhelming. They had to name their new "Cotton Kingdom," organize a postal service, set up customhouses and arsenals, define borders, and set up procedures for handling the complex matters of finance, taxation, diplomacy, and national defense. (9:76)

There was a rough three-to-one manpower advantage for the Union; however, wars are not decided by statistics. The nature of the war equalized the odds. Because the South was pursuing a defensive strategy, a large proportion of its troops could be dedicated directly to the fighting front rather than to maintaining long supply lines and holding captured enemy territory. (14:136) As the Union forces advanced deeper into the South, large percentages of its numerical advantage were drained away to hold important supply depots, communication links, and railway junctions secure. By the final campaigns of the war, General Grant estimated that at least half of the soldiers in the Union armies were not in the main field armies but in some kind of occupation duty and therefore not available for service with the armies' cutting edge. (28:130)

The upshot is that most historians agree that the manpower advantage of the North was not decisive in itself; with proper management the Confederacy could, and in fact did, field adequate numbers of troops to accomplish its military objectives. The war would be decided by the South's ability to marshal all its economic resources to support a sustained military effort in the field, without debilitating the economic base out of which military power must flow. (19:178-182)

The true disadvantage of the South was the state of its *antebellum* economy. Still rural, the South lacked the financial and industrial infrastructure of the North. Factory production of the slave states ranged from 8% to 13% of the free states' output of crude and bar iron, coal, clothing, cotton sheeting, woolen products, and shoes. (12:3-4) At the outbreak of the war, there were approximately 22,000 miles of railroad lines in the North and only 9,000 miles in the South. In addition, the North was able to add 4,000 miles of track connecting strategic locations during the war; the South was able to construct barely 200. (2:42)

After railroads, the next great bulk transportation medium in the nineteenth century was shipping. Here, the South lagged even further behind. Port facilities in the South were excellent, a testament to the importance of the overseas cotton trade to the Southern economy. But in 1858, tonnage built in the North was five times that built in the South, and by 1860, 80% of American capacity was owned by Northern shippers. (21:10)

The situation was even worse than these examples indicate because of the sharp disparity in economic development between the cotton states of the Deep South and the more developed upper South. Transportation and communication in the Deep South were uncoordinated patchworks that would offer little support to a sustained military effort. Industry consisted of a few cotton factories in Georgia, some clothing and shoe shops in New Orleans, and little else.

Though heavily agricultural, the Deep South produced little in the way of military provisions prior to the war. The vast majority of agricultural output prior to the war was in the cash crops of cotton and sugarcane. There were some sweet potatoes, rice, peas, and beans; but these were highly perishable and of little use to armies defending the borders as the transportation system to the upper South was highly undependable. (11:14-27)

In contrast, the upper South was a land of grains, meat, and even some heavy industry. The agriculture of the upper South had diversified from the old dependence on tobacco—the traditional cash crop. Progressive farming techniques employing imported guano from South America, contour plowing and terracing, and farming machinery had resulted in what one scholar has called the “Renaissance of the Upper South.” (10:177-195) One-third of the wheat grown in the United States came from this area, plus oats, rye, barley, and plenty of corn. The ratio of hogs (the main Southern meat animal) to humans was double that of the North; most of these hogs were raised in Kentucky, Tennessee, Maryland, and Virginia. (17:213-215) Over 90% of the South’s pig iron, salt, and coal was produced here. Further, close proximity to the fighting front and lines of transportation made this output accessible where it was most needed. (12:5)

However, the advantage of proximity to the fighting front was a double-edged sword. In 1860, a Southern economic map would have resembled an eggshell, with the bulk of the important military logistics assets located along the exposed northern edges of the South. Unfortunately for the South, the eggshell developed some major cracks as the Confederacy crystallized into its final shape. The failure of the secessionists to carry Missouri, Kentucky, and Maryland into the Confederacy was a major disaster for the Southern logistics war effort. This single factor accounted for the loss of one-third of the grains and animals of the slave states and over one-half of what little industrial capacity the South possessed. Even worse, nearly all the significant iron mills, saltworks, coal mines, flour mills, grain fields, and slaughterhouses were now within 150 miles of the northern border. Any territorial losses at all could result in economic devastation for the Southern Confederacy. (12:4-5)

Historian David Sabine noted that, although the South had the material to accomplish limited military objectives,

the South failed to develop the managerial capacity required for an industrial society. Her greatest weakness lay in the lack of ability to transform raw materials into finished goods. Leadership failed. An *esprit de corps* never developed, especially in her civil organization, and she never made full use of either the human or material resources she had. In the North, civil leaders exceeded the military men in ability, particularly at first; whereas, in the South, military leadership was far more able than the civil throughout the war. (21:13)

By the end of the war, it had become obvious that a concerted effort under a strong central authority was what had been lacking in the Southern war effort.

What was needed was a plan for the integrated management of Southern military and civilian logistics. It was in this area, however, that the South ultimately fell short; and the implications of that failure were largest in the subsistence arena.

Agricultural Logistics

The rich alluvial soil of Mississippi, Alabama, and Louisiana was some of the most fertile in the United States. Although *antebellum* output was dominated by the cash crops of tobacco, cotton, and sugarcane, the large cultivated areas of the Deep South represented great potential for conversion to major food crops for the armies. Even before conversion, the South was

producing quantities of provisions almost equal to the Northern and Midwestern states. Table 1 shows the *per capita* production in bushels of the most important produce in 1860:

PRODUCT	PER CAPITA	BUSHELS
	NORTH	SOUTH
Wheat	5.57	4.78
Corn	25.55	31.05
Oats	7.03	2.18
Rye	.87	.24
Rice		.35
Potatoes (white and sweet)	5.97	4.35

Table 1. (27:154-156)

In addition to the large supply of hogs along the northern fringe of the Confederacy, there were great supplies of cattle. As with hogs, the South boasted a 1.5 ratio of cattle to humans, as opposed to the .66 ratio in the North. And almost all Southern cattle were beef cattle; in the North, 35% of the livestock was kept for dairy farming. Since dairy cattle did not go to the slaughterhouse until they were seven years old, whereas beef cattle were processed when they were three years old, the South could expect an even larger return from their livestock than the figures would indicate. (11:6-7)

But, most Southern foodstuffs were produced by subsistence farmers; the large plantations almost exclusively planted cash crops. As the yeoman farmer was drawn away from his fields and into the army, he would become a consumer rather than a producer; at once demand for food would increase as food production decreased. And while the prewar South was self-sufficient in food production for its people, the livestock rich upper South was heavily dependent on imports from the Midwestern states of feed grains and forage for its hogs and cattle. (13, Vol 2:812) After corn and other grains, the great need of the army was for meat products, primarily pork and beef. The problems faced by the Confederacy in obtaining sufficient quantities of meat were very different than those in obtaining grain products. The most important of these problems were (1) the locations of the South’s prime livestock areas, (2) hog cholera throughout the war, (3) the scarcity of forage, and (4) the problem of meat preservation. These factors combined to make the production of meat the least successful of the South’s agricultural efforts. As a result, while the corn supply increased as the war went on, the meat supply and the standard military ration were continually reduced.

From the outset, Southern planners knew that the awkward location of Southern livestock centers might cause difficulties. The Confederate heartland of the Carolinas, Georgia, and northern Alabama and Mississippi was not a productive livestock region; the bulk of the Southern animals were located along the exposed northern fringe and in the Deep South and Southwest. In the first year, it became apparent that the meat supply was in a very tenuous situation. Data on Southern meat contracts from the packing season stress how the Subsistence Bureau depended on the army to hold its position on the northern borders of the Confederacy. Of 249,000 hogs slaughtered, 193,200 came from Tennessee (two-thirds of these came from the Nashville area); 20,000 were purchased with gold from Kentucky; 35,300 came from Virginia; and 500 came from North Carolina. Arkansas and Texas supplied 2,500,000 pounds of bacon. (24:878-879) If the armies could hold these vital areas,

there would be meat for the foreseeable future; if not, scarcity was not far away.

After a promising start, the South experienced a number of setbacks in its meat supply. The first of these was an outbreak of hog cholera. Although it had first been noted in the Midwest in 1857, it quickly spread through Kentucky, Arkansas, and Tennessee. A careful scholar of Confederate agriculture has concluded that the losses to the Confederate states amounted to millions of dollars. (11:90) The spreading cholera combined with—and was encouraged by—three months of drought and hot weather throughout much of the Confederacy during the summer of 1862, resulting in chronic shortages of both meat and grain products. Commissary General Northrop estimated that the Virginia wheat crop was reduced by three-fourths, from 1,000,000 to 250,000 bushels. (25:158) Tennessee, formerly the center of Confederate animal husbandry, had been so ravaged by the disease that only 20,000 hogs had been slaughtered. (24:873) In the last two years of the war, the disease was reported in Mississippi, Alabama, and Florida; in North Carolina, some farmers reported losing their whole stock.

Even worse than the cholera were the territorial losses the Confederacy suffered in the summer of 1862. By the end of the summer, all of Kentucky, western Tennessee, Missouri, northern Arkansas, and northern Virginia were lost to the enemy. Though the proportion of territory measured in square miles was relatively small, it was some of the most fertile farmland in the Confederacy. As Robert Kean noted in his diary, “The enemy are rapidly confining their hold on Tennessee, its flour and meat so much needed by us. Alas, for our prospects this winter.” (18:111)

Compounding the loss of the productive land was the loss of the packing facility at Thoroughfare Gap, along with the subsistence stores held there. In a classic case of uncoordinated actions, the army withdrew from the area without providing sufficient notice for the Commissary Bureau to arrange for the relocation of the critical provisions, and over 1,000,000 pounds of foodstuffs were abandoned. Overnight, Northrop’s entire meat reserve was gone; and, with the loss of the most productive livestock areas, it would be difficult to replace. For the constrained Confederacy, this was a disaster of the first magnitude, one from which it was never to recover. The interdepartmental bungling that led to its loss resulted in a Congressional investigation and eventually cost the Secretary of War his position, but the damage had already been done. (12:55-56, 24:1034-1042) A major contributor to the lack was the South’s inability to procure sufficient salt to preserve meat for storage and shipment through the hot Southern summers. The Confederacy appears to have lost millions of pounds of beef and pork during the war as a result of improper curing. (30:97)

The Confederacy had relied on four primary sources of internal salt production: salt springs near Manchester, Kentucky; the salt springs at Great Kanawha in Virginia; salt wells near Mobile, Alabama; and the salt wells at Saltville, Virginia. However, Kentucky never joined the Confederacy, and the Union moved quickly to take the Great Kanawha saltworks as they were essential for their own large meat-packing plants in Cincinnati, Ohio. (4:86) The remaining saltworks at Mobile and Saltville were simply inadequate to handle the Confederacy’s growing demand for salt for both the military and civilian sectors.

With the immediate loss of two of its major salt producing centers, and the tightening blockade restricting the amount of imported salt, the South began suffering very early in the war from the lack of this strategic resource.

On balance, though, the South was successful in adapting its agriculture to the demands of the war. In Georgia, for example, the grain crop of 1862 covered over 5,000,000 acres, while cotton had been reduced to 250,000 acres. The corn yield rose from 30,000,000 bushels in 1861 to over 55,000,000 in 1862. (8:16) Throughout the Confederacy, and throughout the war, results of this nature were reported. The Virginia wheat crop recovered from the drought of 1862 and in 1863 was reported to be the largest in 25 years, and in Mississippi it was reported that “the crops and gardens, and the orchards yielded plentifully and that all kinds of poultry thrived in Mississippi.” (29:5) If the wheat crop did prove insufficient, Northrop believed that “there is more than enough corn to make up any deficiency.” (25:971)

When Sherman made his march to the sea through Georgia in 1864, he found the countryside stocked with food. He paid wry tribute to the success of the conversion program for aiding his progress, writing, “Convey to Jeff Davis my personal and official thanks for abolishing cotton and substituting corn and sweet potatoes.” (5:29-30) His commanders reported that “even the most unproductive sections along our line of march yielded enough for our support,” and estimated that they had taken 9,500,000 pounds of corn and other grain and 10,500,000 pounds of fodder in addition to what the animals consumed along the way. (8:16)

Even in March 1865, only weeks before the end of the war and in the midst of widespread hunger and suffering within the army for lack of food, the Commissary General was able to report

that a sufficient surplus remains within the Confederate line in Virginia, North Carolina, upper South Carolina, and East Tennessee [all that remained of the Confederacy by then] to subsist the Confederate forces operating therein until the next crop can be made available. (28:1137)

In the same month, General Longstreet wrote to General Lee that there were large quantities of provisions in North Carolina, “a two or three year’s supply.” (23:1289) Subsistence Bureau officials reported that 12,500,000 rations of bread and 11,500,000 of meat were immediately available in North Carolina and Virginia. (23:1297) Meanwhile, Lee’s army was starving at Petersburg.

Transportation Infrastructure

Long distance transportation within the Confederacy was accomplished primarily by railroad. Rail transportation was supplemented by an active sea blockade running program, but these importations were dependent on rail transportation from the port of entry.

Road transportation in the Confederacy was extremely limited. Most Southern roads were unpaved and unable to handle the volume of traffic required. During periods of rain, these dirt tracks became mud in which wagons soon sank up to their axles. In addition, the demands of the cavalry and a general lack of forage in the South resulted in the breakdown of draft animals. The Quartermaster Department estimated that the Confederacy was consuming 20,000 horses a year: only 5,000 of those were lost in combat; the rest were starved, diseased, abandoned, or sold. (12:73) For relocating the agricultural production of the Deep South and West, and for moving imported supplies to the fighting front, the Confederacy was almost totally dependent on the railroads.

Railroad Network

Southern railroads of the period were private ventures run by corporations catering to a specific market. If it appeared that a profit could be made by running a rail line from Savannah to

Atlanta, a businessman would lay a line from Savannah to Atlanta. Whether or not his line connected with, or was even compatible with, other independent railways in the area was of little concern. The concept of an interconnected network of compatible lines crossing state borders was simply beyond the ability of the average Southern businessman to visualize. As a result, what would seem to be a fairly coherent system dissolves upon closer scrutiny into a chaos of uncoordinated, independent segments. By 1860, there were no less than 170 of these separate concerns. In addition to private business ventures, two states, North Carolina and Georgia, operated their own railroad lines. (20:167-168)

A major strategic shortcoming apparent from the beginning was that there was no rail connection at all to the vital livestock states of Florida and Texas from the rest of the Confederacy. Although a connecting link was eventually built from Florida during the war, the productive regions of Texas were never incorporated into the transportation system of the Confederacy. (3:6-8) This deficiency had dire repercussions for the procurement efforts of Commissary General Northrop. As the upper South was gradually drained of meat supplies, he was forced to turn to Texas and Florida to maintain the supply. Because those states still had no rail link, the War Department tried to drive the cattle north to Georgia for slaughter and shipment to the front. This enterprise "failed of success on account of deficient grass on the route." (25:351) It was shortly after this failed attempt that Northrop was forced to reduce the meat ration (25:414), a consequence directly attributable to the inability of the Southern railroads to transport beef to the areas where it was required.

The isolation of Texas and Florida was only a small part of the general inability of southern railways to handle the demands of a total mobilization. Most difficult to understand today is the lack of any standard gauge among the separate railroad companies. The general Southern standard was 5 feet, but there was wide variation throughout the region. Most Virginia and North Carolina companies, for example, used what was eventually to become the national standard of 4 feet, 8½ inches, but that was not universal even within these states. At least three North Carolina companies, and east-west routes through southern Virginia, used the 5-foot width. Georgia, South Carolina, and Florida also used the 5-foot width, as did most of the companies in Tennessee and Mississippi. In Alabama, however, 4-foot, 8½-inch gauges were common. Texans, naturally, rejected these plebeian dimensions and adopted a regal gauge of 5 feet, 6 inches, while in neighboring Louisiana the more conservative 4-foot, 8½-inch measure was used. (3:9-10)

Worse than the problems with the gauges of the tracks was the situation at what were euphemistically termed "junction points." Even where tracks possessed a common gauge, the rails frequently never actually connected. (1:42) Initially the result of the inability of the businessman to foresee the advantages of integrated transportation, the inefficient practice was continued through the influence of the teamsters who made a living transporting freight from one disconnected line to another. Through their efforts, there was a Virginia law preventing any railroad from laying tracks within the confines of a city without the express consent of its corporate authorities. The result in Richmond, for example, was that none of the five railroads entering the city were connected; in Petersburg, all north-south traffic was obliged to move by horse-drawn cart through the city streets. (3:9) Similar conditions reigned throughout the South. Chattanooga, Knoxville, Bristol, Lynchburg, Charlotte, Raleigh, and Wilmington all required the breaking of freight and drayage.

(29:37) At the critical junction of Augusta on the state line, the Georgia and South Carolina railroads were separated by only 600 yards. Freight arriving at the port of Charleston had to be ferried across the river to the rail station on the opposite bank for shipment to the interior. (3:9-10)

Further limitations of the southern railroads were exemplified at Bull Run. After a shaky beginning, the First Battle of Bull Run was transformed from certain defeat to a resounding Southern victory by the arrival of fresh reinforcements from the Shenandoah Valley by rail just at the crucial point in the contest. It was proposed to follow up the victory with a general assault on the demoralized Federal army that had retreated to Washington, but the inability of the Subsistence Bureau to forward provisions for the extended movements necessary made the operation impossible. General Beauregard, the Confederate commander at Bull Run, touched off a storm by writing:

The want of food and transportation had made us lose all the fruits of our victory. We ought at this moment to be in or about Washington. Cannot something be done towards furnishing us more expeditiously and regularly with food and transportation? (12:23)

The shortages continued in the weeks following the battle, and Northrop immediately became the focus of public and official criticism. Mrs Chestnut confided in her diary:

Now, if I were to pick out the best abused, where all catch it so bountifully, I should say Mr Commissary-General Northrop is the most cussed and vilified man in the Confederacy. He is held accountable for everything that goes wrong in the army.... They say Beauregard writes that his army is on the verge of starvation. (6:124)

When Northrop was unable to forward 1,000 barrels of urgently needed flour from Richmond to the front because of lack of transportation, a telegraphic chain reaction of charges, countercharges, recriminations, and excuses instantly exploded. Northrop protested that he had already sent 2,000 barrels in addition to the 1,000 requested, but that they were not getting through due to "some difficulties on the roads. The agent of the Central Railroad writes that it is impossible to transport the flour." (22:857-8)

A full-blown Congressional investigation resulted (the same that looked into the Thoroughfare Gap fiasco) as the dimensions of the transportation snafu became apparent, and tempers became strained. The investigation gradually revealed that the army had been holding the railroad cars at the front for use as makeshift storage facilities, rather than unloading and returning them to the depots. (22:857-8) Northrop was cleared of blame, but the investigation picked up momentum, claiming the Secretary of War as its first victim. His replacement wrote curtly to the Quartermaster General complaining of the slow progress in unraveling the mess as the remaining parties scrambled for cover:

Sir: I have your letter of the 21st instant, which exonerates from blame the quartermaster at Manassas, but this is only half the result required in my letter to you of the 20th instant. I desire to know whose is the fault that the transportation on the road was so blocked up by the absence of cars from Richmond that the Commissary General was unable to get one thousand barrels of flour conveyed to the army on an emergency. We now have a definite issue before us. You have ascertained that the blame was not attributable to the officer at Manassas. Who was the delinquent? I must insist that the investigation be pursued until the question is satisfactorily answered. (22:871)

Out of the inquiry emerged the realization that the existing relaxed arrangements were simply insufficient to handle the complexities presented by the sheer scope of Confederate logistics. With transportation resources already cramped at the outset, and with every prospect of becoming more constrained

as the war continued, some central authority was needed to set priorities and balance conflicting requirements. The present system provided no coordination whatsoever; everywhere, local quartermasters entered into local arrangements with the local railroads believing that the doctrine of *laissez-faire* could be successfully applied to the problems of military transportation. The result was an inefficient application of the transportation resources available and internecine squabbling among Bureau chiefs, departmental commanders in the armies, and the civilian administration.

The meat supply at Thoroughfare Gap, for example, was lost because of the inability of the regional commissary officer to obtain sufficient transportation in time to move the provisions to a safe location. He explained to Northrop:

I received from you notice of the proposed evacuation of Manassas... two weeks before it occurred, and could I have obtained the transportation by railroad which was promised all the property at Thoroughfare could have been removed during the first week; had I been told that such transportation could not be had I could have removed it all by wagons to Warrenton within the time, but I was not aware of that fact until the day before the evacuation occurred. (24:1039)

Clearly, some sort of broad control over the railroad network was required to coordinate the interdepartmental ramifications of the first modern war.

The Confederate rail transportation problems quickly accelerated. The biggest problem was that the flimsy system, already short of engines and cars, was wearing out under the strain. Trains were subject to delay from the slow operating speeds, breakdowns, wrecks, and lack of repair capability. The great material need was for rails. Experts estimated that 49,500 tons of new rails were required annually to simply maintain the 6,300 miles of road integral to the war effort. Further, the entire capacity of Southern industry amounted to only 18,000 tons annually "assuming the relinquishment by the Government of all other work to be done." (25:512-13) In fact, research has not discovered evidence of the first rail (or locomotive) produced in the South during the war; the limited industrial capacity was quickly consumed by munitions requirements. (26:1092)

Shipping and Blockade Running

Blockade runners experienced relative success in eluding the blockade, but too often their cargoes were dominated by popular but unnecessary articles such as silk and liquor, while meat purchased for shipment to the South spoiled on the wharves. Confederate purchasing agents had been dispatched to Europe to arrange contracts for supplies and to arrange for tramp steamers to carry the goods to Bermuda or Nassau. At these ports, other Confederate agents supervised the repacking of the goods into smaller lots for loading on light, fast steamers to make the run past the blockade into Confederate ports. (7:48-50) It was here that the system began to break down, as most of the blockade runners were privately owned and preferred to carry the higher priced, popular goods rather than the more bulky and less lucrative military cargoes. Northrop wrote to the Secretary explaining why enforcement of regulations requiring blockade runners to dedicate half of their cargoes to military goods was necessary:

Blockaders seek freight of great condensed value and little specific gravity; therefore meat is not brought in when it can be avoided. In fact, what has been accumulated at the islands [Bermuda and Nassau] has not been brought in fast enough to keep it from spoiling. (26:931)

Slow shipping aggravated the meat spoilage problem that the salt shortage had caused. Such spoilage constituted a great loss

to the Confederacy, so much so that Northrop suspected that meat that was still edible was being discarded unnecessarily. He wrote to his agents in the field:

If your box meat is condemned because it does not look red, perhaps, cook some and get the general or commanding officer to try it. If not spoiled, make a struggle against the board of survey. (24:1037)

Nevertheless, meat was decomposing so rapidly in the humid conditions in the islands that Northrop was just as happy that more had not been accumulated there; otherwise there would be "a still greater loss than attends their delay at those points for want of steam transportation hither." (26:380) After the war, one Confederate officer wrote:

Into Wilmington was brought by Mr Northrop that rotten, putrid bacon called 'Nassau' because it had spoiled on the wharves of that place, before being reshipped to Wilmington. It was coarse Western bacon bought by Confederate Emissaries at the North; and many a time here we implored curses on poor Northrop's head as we worried down a piece of the rancid stuff. (16:497)

Summary

Delay of the necessary legislation to control the transportation network resulted in great loss and inefficiency in the subsistence process. In his study of the Confederacy's railroads during the conflict, Robert Black concluded that the Confederates had committed two major logistical errors, mistakes which apply to the management of their oceangoing transportation system as well. First, he determined that owners, managers, and even employees were unwilling to sacrifice their personal interests. Railroad companies refused to allow relocation of nonessential track to areas of heavy use, and only grudgingly transported government freight (often Northrop's bulky grain shipments), when more profitable commercial freight was available. The identical practice prevailed in the shipping industry, where blockade runners ignored military cargoes for the lucrative luxury trade in liquor and silk. Second, and more important, Black asserted that the Confederate Government was loath to enforce the kind of transportation policy the war effort demanded. He concluded:

Calhoun's glorification of the individual state may have provided a satisfactory political philosophy for outnumbered southerners in the old Union, but they were hardly the engine of unity in the face of military attack. [The theory] had, over the decades, so permeated the thinking of southerners that they stood in terror of their own creation at Richmond. Without either wholehearted public cooperation, or government coercion, it is practically impossible to wage a modern war. It is well to possess both of these things. The Confederacy had too little of either. (3:294-295)

Without the efficient use of transportation, especially the railroads, the Confederate logistics effort was severely crippled. Dependent as it was on the ability to continuously relocate large quantities of supplies from distant regions, the Subsistence Bureau was grievously affected resulting in great hardship and the illusion that Southern food supplies were inadequate to meet the demands of the war. The catastrophic effects of the transportation breakdown on the subsistence effort are summarized by historian Charles Wesley:

These variations [in food prices] and the apparent scarcity of food were due not to the fact that there was no food raised in the South, but that the transportation facilities could not make the food available to the people and the armies. Transportation was the great problem of the Confederacy, and it was one of the influential material causes in bringing about the collapse. (29:42)

Lessons Learned

The subsistence effort of the Confederacy serves as a laboratory where one can observe approaches to logistics problems and their consequences, and derive an understanding of the tradeoffs inherent in the allocation of scarce logistics resources. From the start, the Confederate war effort struggled to catch up. The inability of the Confederacy to carry all 15 Southern states into secession denied to the Confederacy large productive areas. In addition, it left the most productive agricultural and industrial regions of the seceding states perilously exposed to the Union. The very size of the country worked against the Confederacy. The supplies of beef cattle in Texas were as remote to Northrop in Richmond as provisions in Madrid would be to military planners in Berlin. When the undependable nature of the Southern railroads are factored into the equation, the magnitude of the Confederate subsistence problem becomes clear.

Though scanty resources demanded aggressive planning and centralized controls, the Confederate leaders never developed a comprehensive plan to address the problems. Creating a centralized bureaucracy to allocate resources for the general welfare was antithetical to everything for which the Confederacy stood. Nor would Confederate citizens, who had taken pride in their libertarian philosophies, have submitted to any such intrusions of national authority. Still, while the politicians could not have been expected to create a coldly efficient war machine, they could have attempted a careful estimation of available resources and mapped out a strategic plan to make the best possible use of them. Confederate leaders compared their situation with that of the founding fathers; in their idealistic fervor, however, they failed to recognize the harsh fact that the advancing technology of warfare inaugurated by the industrial revolution had rendered the hand-to-mouth approach to logistics of the Revolution obsolete.

There is no evidence that civilian and military leaders ever considered effective plans to coordinate the massive logistics problems they faced. In fact, it does not appear that they even considered logistics a primary factor in their military capability. Northrop's peers in charge of the various supply Bureaus were commissioned only as colonels, a fact that contributed mightily to the problems in controlling interference by field generals with the subsistence arrangements. In the beginning, most Confederates hoped for a short war; as that mirage faded, they did not plan any comprehensive approach to effectively mobilize the nation's shrinking resources. Instead, as the conflict developed into a war of attrition on an unprecedented scale, the leaders were forced to react to circumstances in a stopgap way to keep the fighting going. As a result, by the end of the war, the Confederacy had assumed many of the features of a centralized state, but these characteristics came too late to solve the original crisis. Instead, they fostered resentment in the populace, and often aggravated problems. Prevented by their ideologies from immediately devising a comprehensive program for the management of Southern resources, Confederate leaders attacked the symptoms, but not the causes, of their logistical decline.

This analysis has examined agricultural production, transportation, and logistics administration. It would be tempting to single out one of these to credit with the breakdown of the subsistence effort; but the facts indicate that, while not any one of the factors was fatal alone, taken together they combined to overwhelm Northrop's Bureau. In each area, the Confederacy entered the war with significant handicaps that would require

action to prevent degradation of subsistence potential. In the agricultural arena, that handicap was an overwhelming dedication of productive land to cash rather than to food crops; in the transportation area, it was the uncoordinated and fragile railroad system; and in the administrative arena, it was the philosophical background of the Confederacy. To the degree that progress was made in addressing those shortcomings, the demands placed on the other two areas were lessened. Conversely, failure to adequately address a deficiency in one area placed an even greater strain on the remaining two.

Agricultural Policies

Overall, the effort in the agricultural area appears to have been adequate. Starting with an overwhelming dedication to cash crops, Southerners were able to convert enough acres to food production to sustain both the armies and the general populace. Declining agricultural capacity due to territorial losses, speculation, meat spoilage due to lack of salt, and loss of supplies to capture, for example, all decreased the aggregate stock of provisions available; but there was never too little to meet overall requirements. The effect of the reductions was to require the Confederacy to operate with maximum efficiency in drawing available supplies from producing regions and redistributing them where needed. The entire Confederacy would have to be gleaned for all available surplus foodstuffs. This placed a premium on dependable transportation and flexible, effective, logistics administration.

Transportation Policies

The effort to build an effective transportation network must be rated no better than marginal. Beginning with a disjointed system barely adequate in the best of circumstances, the network was allowed to decline rapidly. Beyond the physical deterioration was the wasteful use of the capacity that was available. Use of cars as storage facilities, shuttling of provisions back and forth from remote depot locations, dedication of large amounts of capacity to civilian traffic, and probably most damaging of all, refusal to force relocation of engines and rails to strategic routes, all rendered available capacity less efficient. Almost identical strictures prevailed in the shipping—or blockade running—industry. The result was a slowing down of shipments from producing to consuming regions, and a huge investment in pipeline goods at any given time. Widely dispersed agricultural production, combined with an undependable and slow transportation system, demanded a highly efficient management of Confederate logistics programs to stretch available resources to the fullest possible extent.

Administrative Policies

National Policies. The administration of the Confederate Subsistence Bureau occurred within the context of Confederate management of overall logistics issues. The primary means of tapping national economic power was through appeals for voluntary cooperation. The effectiveness of these appeals varied, depending on the sector of the economy being addressed. The patriotic campaign for conversion of agricultural land to food products was successful; calls for or voluntary cooperation by the railroad industry, while applauded verbally, often failed in substantive results. No doubt the variation in success is ultimately due to the latent strengths of the respective sectors of the Southern economy. But when appeals for voluntary cooperation proved insufficient, the national authorities were incapable of implementing more authoritarian measures until the

situation was beyond retrieval. Here, the genius of Lee and the general combat effectiveness of the Confederate military may have provided an ironic disservice. Obscured by battlefield triumphs, Confederate military might was rotting away from the inside virtually unrecognized by any authorities higher than the Bureau chiefs.

In addition to tardiness in implementing comprehensive measures to focus economic power onto military applications, the national authorities further compounded the difficulties faced by the Subsistence Bureau by allowing the financial base of the country to rest on nothing more substantial than overactive printing presses. Progressive deterioration of the fiscal structure of the country produced a galloping inflation which forced reliance on forced sales at fixed prices to pry the ever more valuable goods from the hands of speculators. This caused hoarding, resulting in a further decrease of supplies.

These factors were outside the scope of the Subsistence Bureau to correct, but they need not have been outside the influence of the War Department. As the element of the government most directly dealing with civilian business on a daily basis, the Department was ideally situated to monitor the detrimental effect governmental policies were having on the national economic pulse, as well as how those effects were relentlessly being translated into reduced military capability. But while the information continually flowed into the Department, it never seemed to flow on up the chain. Because of rapid turnover and the President's autocratic style, the office of Secretary of War never acquired the influence needed to become a powerful advocate of the logistics perspective. Instead, it became a powerless intermediary between the aggressive pragmatism of the bureau chiefs and the entrenched conservatism of the President. Priority deferred to the manpower needs of the field generals; the civilian sector was stripped of the workers necessary to maintain productive capacity, and the Subsistence Bureau was left with too few and too inept a staff to pursue its policies in a fair, vigorous manner.

Subsistence Bureau Policies. The Bureau has traditionally been considered the black sheep of the Confederate war effort, but unjustly so. Complaints have usually centered on the personality of its chief, or around such seeming contradictions as putting the armies on short rations while food was rotting on wharves. Strangely, the *ad hominem* argument may have some validity to it. Northrop was not the easiest man with which to work. He could be stubborn, cantankerous, and pessimistic. There were undoubtedly more popular, energetic men better capable of inspiring the public's confidence. But in the daily disposition of affairs he was reasonably efficient, and even showed a degree of insight and ingenuity rare in the Confederacy. He was an early advocate of such measures as trading cotton for food and government management of the railroad and shipping industries, and attempted to forestall the negative effects of the loss of territory by concentrating his efforts on exposed areas. It is true that meat spoiled in storage and in transit, but this is more a commentary on the reliability of the railroads than on the efficiency of the bureau.

A better criticism of his arrangements was his obstinate insistence on centralized purchasing and warehousing in the first years of the war. To his credit, however, when it became apparent that his system placed too great a reliance on the railroads, and fostered ruinous competition with field commissary officers, he reorganized his bureau for greater effectiveness. Any other Commissary General would, like Northrop, have been confronted by circumstances beyond his control. Breakdown of the railroads, loss of productive areas, and economic chaos were

uncontrollable factors that hamstrung his provisioning policies. Worse, any plan he devised to circumvent these factors was doomed through the ineffectiveness of the War Department. Constrained at home, Northrop continually hounded his superiors for permission to trade through the lines and made arrangements with blockade runners to secure meat from overseas; but again, his plans were impeded by resistance from above. Based on the evidence, he appears to have been a good administrator who devised procedures that were logical and effective up to a point, that point being the delivery of subsistence to the railroads. It is unlikely that anyone else could have done much better under the same set of circumstances.

A Contemporary Perspective

In concluding this review of the Confederate subsistence effort, its seems appropriate to point out some of the lessons:

(1) A fundamental flaw in the Confederate military effort was the lack of congruence between military strategy and logistics management. The essentially defensive military strategy adopted by the Confederates made a long-term war of attrition inevitable. However, they neglected to coordinate an appropriate logistics strategy. Almost invariably, competition between supply and combat units for scarce resources was decided in favor of the combat units, with the result that Confederate military power eroded away from the inside rather than from military reversals in the field. Granted, the growing logistics requirements of warfare in the newly industrialized world were unknown by either side at the outset of the war, so these allocations were made more by default than by any conscious deliberations. Nevertheless, the effects of those allocations on the long-term combat effectiveness of the Confederacy are clear.

Sustained military power is no longer simply a function of combat prowess. To ignore logistics requirements and capabilities in determining national military strategies, or to plan national military strategies without coordinating a congruent logistics strategy, is to undermine long-term military strength.

(2) The Confederates did a poor job of nursing the economic base on which their subsistence effort, logistics in general, and ultimately, military power, depended. This was especially damaging to their cause, having chosen a military strategy that placed a premium on economic strength rather than immediate military power.

(3) The Confederate experience reinforces the awareness that military power can ultimately be dependent on strategic minerals. For the Confederacy, salt was a strategic mineral, the lack of which continually hampered efforts at maintaining adequate meat supplies for the army. The Confederate ordeal reminds us that consideration of scarce resources must extend beyond the cutting edge of weapons technology, to the less glamorous, everyday materials on which logistics capability rests. That this lesson remained unlearned as late as World War II is seen in the belated discovery by military planners that a shortage of rubber for tires could compromise mobility and logistics operation as rapidly as lack of petroleum, oil and lubricants (POL) or enemy air strikes. The Confederate experience suggests that a comprehensive review of strategic logistics resources, similar to the General Accounting Office (GAO) report on high-technology minerals issued in June of 1988, is necessary.

(4) A study of Confederate subsistence logistics makes it clear that logistics policy has to be managed from a single point of authority, with power to coordinate logistics operations over the entire spectrum of military activity. The inability of the War

Department to serve as that "centre of unity," as Northrop phrased it, led to wasteful squabbling. Further, that single source of broad logistics policy must be incorporated in planning the strategic applications of military power. Exclusion of the Secretary of War from military planning caused poor logistics support of military operations, competition over transportation resources, and the loss of millions of pounds of subsistence stores in the wake of uncoordinated troop withdrawals.

(5) The single, large issue may be in recognizing, as the Confederates did not, that changing technological, political, and economic frontiers require a constant stretching of national priorities, policies, and strategies. The Confederates approached the problems of their day with an essentially backward-looking orientation. They thought, organized, and planned on a state level, when the progress towards larger political, economic, and military interdependencies required an orientation at the national level. The fundamental lesson that the study of Confederate subsistence can teach is that, having absorbed the lessons of the Civil War, and having cooperated on a national level for over a century, that the time for a reevaluation of our orientation has arrived.

The shift to a multi-polar world, the incipient rise of an economically unified United States of Europe, the decline of the Cold War, and the growing integration of the communist states into the global economy all signify a greater commonality of interests on a larger scale than ever before. We can no longer plan on a national level; our interests are international in scope, and our military planning must reflect that fact.

Similar portents of an expanding political horizon were all around the Confederacy: the Industrial Revolution, the consolidation of national governments in Europe, large-scale international trade, and the almost universal abolition of slavery by 1860. Yet, the Confederates ignored those and clung to their individualistic, states' rights orientation. This mindset prevented the coordinated management of the national logistics infrastructure, produced squabbling between governors and national authorities, and resulted in a fragmented and incomplete mobilization of the resources of the Confederacy. The Confederates fought the first modern war using a political orientation from the past, and their logistics effort suffered.

Recently, in the Persian Gulf, we found ourselves in a situation very similar to that facing the Confederates in 1860. Substitute national patriotism for states' rights, the United States for the Trans-Mississippi Department, the Atlantic Ocean for the Mississippi, and the implications for logistics policy are clear. The United States, as in World War II, found itself a remote element, but critical element, in a war with global logistical implications. As with the Confederate States, this conflict required the complete and efficient mobilization of logistics resources. Weapons development, industrial capacity, mobilization of the civilian sector, manpower allocations, transportation networks, and all the other components that comprise logistics capability required coordinated management at the international level for the most efficient mobilization of the military unit's resources.

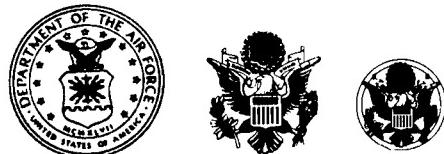
The Confederate experience shows that war can be waged in a collective manner by independent political units, each managing its own economy, supplying its own troops, and balancing military requirements with its individual motivations. The record goes on to show, however, that the logistics effort in such an arrangement will be severely degraded by uncoordinated action, incomplete mobilization of resources, and subordination of collective priorities to individual concerns. The inescapable result is a lessening of military effectiveness.

(Capt Washburn is now assigned to HQ AFLC/XPRO.)

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CAREER AND PERSONNEL INFORMATION

Logistics Professional Development

Selecting Logistics Squadron Commanders

By now, most officers have read and understand the mechanics behind the selection process for filling squadron commander billets. Basically, the Air Force Military Personnel Center (AFMPC) looks 18 months out, identifies logistics field grade officers who are eligible to move (two years for overseas, three years on station for CONUS, completing a coded tour, or having a DEROS), and makes them available to all major commands (MAJCOMs). After the MAJCOMs receive the list, they either hold selection boards or just select from the list. As a rule, the first MAJCOM to make a firm offer for an officer will get him/her—a simple process perhaps, but one that involves a lot of factors. Some of the observations made by a recent MAJCOM maintenance selection board were:

On the question of competitiveness...

Major selectees/junior majors did not compete well if they had stovepiped themselves. Officers who had held a variety of jobs in the Deputy Commander for Maintenance (DCM) complex (Component Repair Squadron (CRS), Equipment Maintenance Squadron (EMS), Aircraft Generation Squadron (AGS), and the staff), along with career-broadening assignments, competed much more favorably than those who were strictly in AGS or Ammo. The board strongly suggests that DCMs ensure their officers reflect the ability to perform well in all areas of maintenance.

Rated personnel did not fare well unless they had previous jobs in maintenance (functional check flight officer, Officer in Charge of Quality Assurance, assistant maintenance supervisor, etc.).

Continued from page 16.

²²Tunner, *Over the Hump*, pp. 88-89; Moser, *China-Burma-India*, p. 84.

²³History of the India-China Wing, Air Transport Command, June-December 1943 (Andrews Field, DC: Office of ATC History, 1944), pp. 76-89; War Department, Public Relations, "India-China Wing, ATC, Receives Presidential Citation," 29 January 1944, Office of MAC History; Maj Gen H. L. George, Commander, ATC, to Brig Gen Earl S. Hoag, Commander, I-C Wing, 5 February 1944, Office of MAC History; Gen H. H. Arnold, Commander, AAF, to President F. D. Roosevelt, 5 January 1944, Office of MAC History; President F. D. Roosevelt to Gen H. H. Arnold, Commander, AAF, 6 January 1944, Office of MAC History; Brig Gen C. R. Smith, Deputy Chief of Staff, ATC, to ATC Headquarters Division, "Results of Increased 'Hump' Tonnage," 18 February 1944, AFHRC.

²⁴Brig Gen C. R. Smith, Deputy Chief of Staff, ATC, to Maj Gen H. L. George, Commander, ATC, 1 December, 5 December 1943, AFHRC; *History of India-China Wing*, June-December 1943, pp. 175-76.

²⁵Thorne, Bliss K. *The Hump: The Great Military Airlift of World War II* (Philadelphia: J. P. Lippincott, 1965), pp. 28-29.

²⁶Gray, Diary, 11 October 1943.

²⁷1st Lt John G. Nesbitt, I-C Wing, "Weekly Intelligence Summary," 7 August 1943, 14 August 1943, 21 August 1943, Office of MAC History; Maj

The message on stovepiping...

Stovepiping is bad—four to five years in AGS, or explosive ordnance disposal (EOD), or for that matter, in any single job, sends the wrong message. Demonstrating ability in various jobs produced a higher rating for those officers considered. The board favored officers who had both aircraft and munitions experience versus those that only had one.

Helping yourself...

Since officers do not personally meet the board, members only have their records before them. How current are they? When boards find outdated AF Forms 90 and official photos, what are they telling them? Boards also compared personnel data such as the assignment SURF (Single Unit Retrieval Format), which has the most current job titles, with OPRs/OERs and found inconsistencies. In fact, the board said that this problem could have been alleviated if the supervisor had submitted the proper Forms 2096. Personnel need to take credit for what they are doing and get their records up to speed.

In simple terms, if officers are within 18 months of their 3 years on station, a coded tour, or their DEROS, have no disqualifying factors (UIFs), and are field grade officers or selectees, their names will be provided to the MAJCOMs for consideration. The MAJCOMs are provided with names every March and September... individuals know the target. How well they compete depends on how well they have prepared for this important time in their career.

(Lt Col G. B. Vega/AFMPC/DPMRSL/DSN 487-3873. We wish to thank Col Ronald Q. Cox, Director of Aerospace Maintenance, DCS/Logistics, HQ USAFE, for providing these observations and allowing us to include them in our article.)

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²⁸Tunner, *Over the Hump*, pp. 51-52; Heck, *Airlift to China*, pp. 133-34.

²⁹Attachment 3 to Charles W. Dickens, Chief, Office of MAC History, to Maj Gen James I. Baginski, 4 September 1981, Office of MAC History, "Air Transport and its India China Division," ca. 1945.

³⁰Tunner, *Over the Hump*, pp. 67-69; Heck, "Airline to China," pp. 142-43.

³¹Ibid., pp. 94-95.

³²Moser, *China-Burma-India*, p. 86; Koenig, *Over the Hump*, pp. 146-48; Heck, "Airline to India," pp. 140-41.

³³History of the India-China Division, Air Transport Command, 1945 (Andrews Field: Office of ATC History, 1946), pp. 100-114; Heck, "Airline to China," pp. 150-51.

³⁴Koenig, *Over the Hump*, pp. 151-55.

³⁵Ibid., pp. 155-58.

³⁶Air Operations in China, Burma, India, World War II (Washington DC: United States Strategic Bombing Survey, 1947), p. 101.

³⁷Taylor, Joe G. *Air Supply in the Burma Campaigns* (Maxwell AFB: United States Air Force Historical Division, 1957), p. 142.

Improving Technical Order 00-25-107 Requests

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Background

In July 1990, HQ Tactical Air Command tasked the Air Force Logistics Management Center (AFLMC) to explore current technology which would help a unit prepare a request for depot maintenance for one of its assigned aircraft.

Currently, the process, outlined in Technical Order 00-25-107, calls for the unit to prepare a message describing the damage to the aircraft, tools and parts available, and many other details. TAC reported this process to be very cumbersome because some units take up to three hours to write the message.

When the message is complete, the burden increases when HQ TAC receives it for validation and tracking. Since TAC often receives 150 to 200 requests for depot maintenance monthly, they have resorted to a computer program to track these requests and catalog them for future reference.

Once validated, TAC retransmits a message to Air Logistics Center (ALC) engineers responsible for repair of the aircraft. Once the engineers have a chance to read the message, a repair plan for the aircraft can be developed. If the damage described by the message is vague or not understood by the engineers, they will ask TAC for pictures of the damage or they may even go TDY to the unit to ascertain the problem.

Without some way to transmit pictures and other data rapidly, the current process leaves the damaged aircraft grounded for an unacceptable amount of time while engineers sort out the exact problem. In some cases the damaged aircraft often becomes the donor of spare parts for other aircraft. It may be several months before the aircraft is capable of flying.

LMC's Approach

We initiated our work by contacting several Department of Defense Agencies; namely, the Air Force Office of Scientific Research, the Data and Analysis Center for Software, the Non-Destructive Testing Information Analysis Center, the Standard Systems Center, and the Aerospace Audiovisual Squadron. We also contacted Carnegie-Mellon University and the Texas Research Institutes. We wanted to learn if there was ongoing work to develop technology to transmit pictures and text using microcomputer equipment.

We found out these agencies use standard commercial off-the-shelf microcomputer equipment in a variety of applications for picture and text transmission. The technology in use is called **Multi-Media Applications**.

Explanation and Example

Here is how Multi-Media Applications works (Figure 1). Let's imagine an aircraft has a cracked panel which is beyond the repair capability of the unit. A person can use an ordinary Polaroid Camera to take a picture of the crack. The picture is scanned by microcomputing equipment which automatically enhances the picture. The enhancement corrects imperfections in color and shading. The unit then dials the microcomputing equipment at major command level via a modem. Once the two

machines are linked, a person at the unit presses a key and transmits the picture and any associated comments. Now command and unit personnel see the same picture. The staff at command level can verify and make a permanent copy of the damage (either on floppy disk or a hard copy by laser printer). Next, command personnel dial and link their computer to the ALC responsible for the aircraft. Once connected, all three agencies see the picture and discuss the problem on the telephone. The engineers can then determine how the crack needs to be repaired. Repair instructions can be written electronically on the picture and the unit level can make a hard copy of these instructions. The hard copy goes to the technician who makes the repair. This process under current technical order 00-25-107 guidance sometimes takes several weeks. But, use of Multi-Media Applications can reduce the time to several minutes.

MULTI MEDIA APPLICATIONS

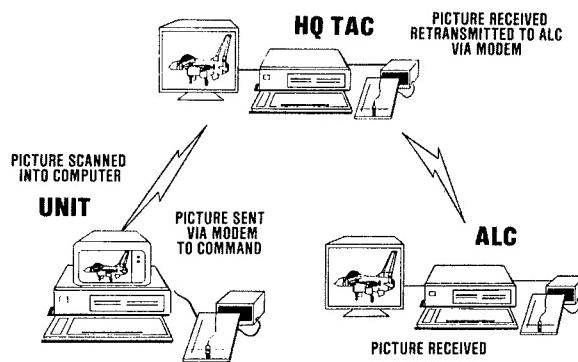


Figure 1.

Imagine sending pictures of not only aircraft but also electronic components from one point to another. Suppose the ALC must issue an Immediate Action Time Compliance Technical Order (TCTO) to the field on the correct hookup of a cable assembly into an electronic module. It may be a critical hookup, because if the hookup is incorrect, the module could be damaged. The ALC could take a picture of the cable and the module and show rather than try to describe in words how to hook up the cable to the module (Figure 2 shows an example of such an electrically transmitted picture).

The time savings in development and publication of the TCTO would be significant. The picture with documentation could be sent in a matter of minutes instead of a TCTO package taking several days to produce, let alone distribute.

One agency which makes extensive use of Multi-Media Applications is the NASA Space Shuttle program. In light of the Challenger disaster, more approvals are needed in the maintenance of the space shuttle. Due to the complex nature of

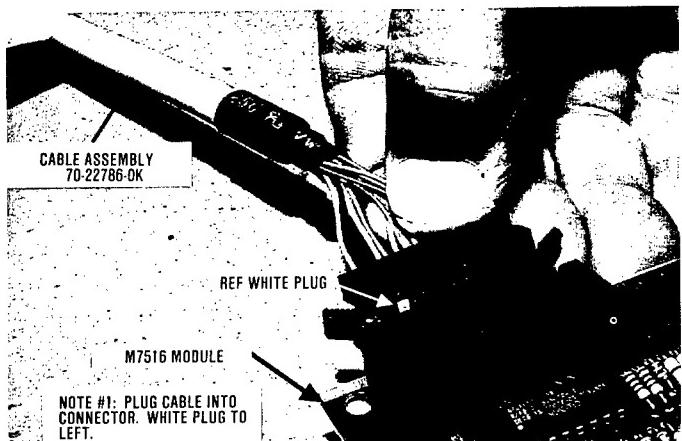


Figure 2.

the components involved and the time involved in maintenance, the Space Shuttle Program uses microcomputer equipment to send both pictures and text from maintenance facilities to gain accurate and timely approval for repair plans.

Another unique feature of Multi-Media Applications is its flexibility. Much of the equipment works with standard telephone jacks and connections and with both standard and secure telephone equipment. Setup and use of this equipment is

both fast and simple—about as fast and simple as connecting a home VCR to a television set.

Conclusion

The technology to address the problem as stated at the beginning of this article is available and feasible. Multi-Media Applications appears to be a promising way to use technology to decrease aircraft downtime, headquarters staff burden, and engineering support delays.

Recommendations

We are recommending a lease of equipment from a vendor of Multi-Media Microcomputing Equipment for a six-month test to determine its effectiveness in reducing the problems involved in depot repair requests. This leased equipment could be placed at a test base, at a command, and at the Air Force Logistics Command.

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Most Significant Article Award

The Editorial Advisory Board has selected "The Air Force Logistics Assessment Architecture" by Colonel Douglas Blazer, USAF, as the most significant article in the Winter 1991 issue of the *Air Force Journal of Logistics*.

Most Significant Article Award of 1990

The Editorial Advisory Board has selected "Fighter Design From the Soviet Perspective (Part I)" by Richard D. Ward as the most significant article published in the *Air Force Journal of Logistics* during 1990.

Inside Logistics

Exploring the Heart of Logistics

PACER INTEGRATE Improves Distribution Support to Depot Maintenance

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PACER INTEGRATE

Teamwork, partnership, customer satisfaction, continuous process improvement, streamlining, efficiency, savings—all the ingredients of doing business better are built into PACER INTEGRATE, an AFLC initiative to improve distribution support to the depot maintenance activities at the five air logistics centers (ALCs) (Figure 1).

PACER INTEGRATE SITES at AIR LOGISTICS CENTERS

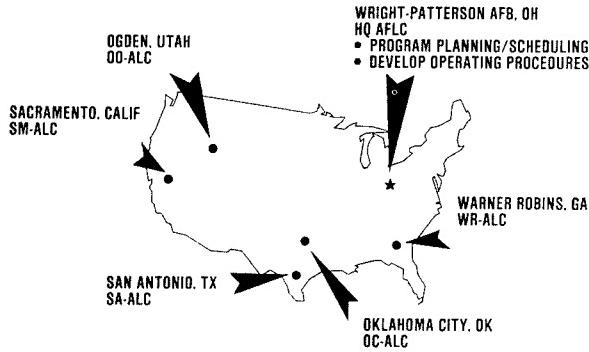


Figure 1.

Designed to cut costs, improve supply and transportation processes, and increase depot maintenance production

capabilities, PACER INTEGRATE will transfer distribution functions performed in maintenance operations at the ALCs to the distribution activity, according to Lieutenant Colonel Gary T. McCoy (co-author of this article). "Under PACER INTEGRATE, maintenance will buy only what is needed and pay for it only at the time of issue to the production floor. We want to keep only the amount of materiel on hand that we need to meet the production requirement," he said. "Any excesses cost the taxpayer money, so we want to be very careful in our forecasts and analysis of what's really required."

A prototype of the program began at Ogden ALC, Hill AFB, Utah, in July 1990.

Why PACER INTEGRATE?

The PACER INTEGRATE concept has been considered in one form or another for more than 10 years. The primary stimulus for this initiative was to relieve the Depot Maintenance Service, Air Force Industrial Fund (DMS AFIF), of the excessive cost involved in stocking materiel not in work. This has been especially necessary during periods of austere resources. As budgets shrank in the early 1970s, depot maintenance workloads grew to support new weapon systems and the workload that had been deferred during years of conflict in Southeast Asia. The inability of the stock fund to support the increased demand, coupled with outdated logistics data systems, forced depot maintenance activities to build their own distribution capabilities. Over time, this system has become excessively expensive and duplicates the ALC distribution function. Today, AFLC can simply no longer afford this duplication of effort and materiel, the blurring of roles and functions, and in many cases waste of valuable assets. AFLC must look for improved methods of providing distribution support to depot maintenance activities.

Concept Development and Planning

Concept development for PACER INTEGRATE began in August 1988. At the direction of the AFLC commander, a joint AFLC maintenance and distribution team was formed to put together a plan that would merge the materiel functions in maintenance with those of the ALC distribution activity. Additionally, the team was tasked with finding ways to bring improvements to the overall process. In essence, the goal was to "get maintenance out of the distribution business" so maintenance could concentrate on its primary function of repair and modification and make the process work better. In January 1989, a concept of operation was approved and a full-time program office was established at AFLC Headquarters. Subsequently, planning teams have been formed at each of the five ALCS that are aggressively preparing for PACER INTEGRATE implementation.

SYSTEMS SUPPORT

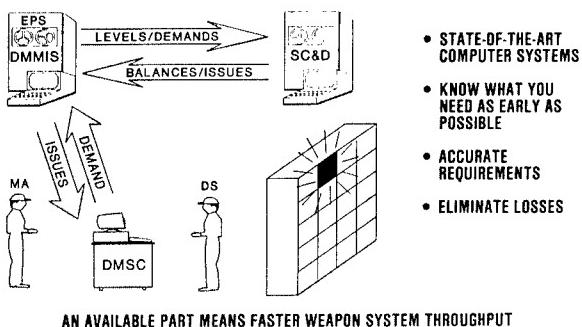


Figure 2.

DEPOT MAINTENANCE SUPPORT CENTER

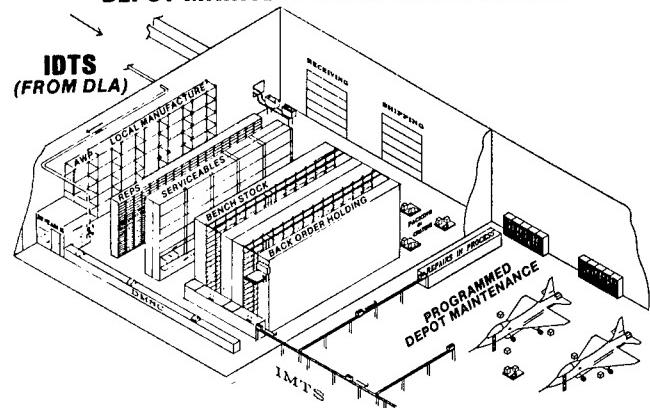


Figure 3.

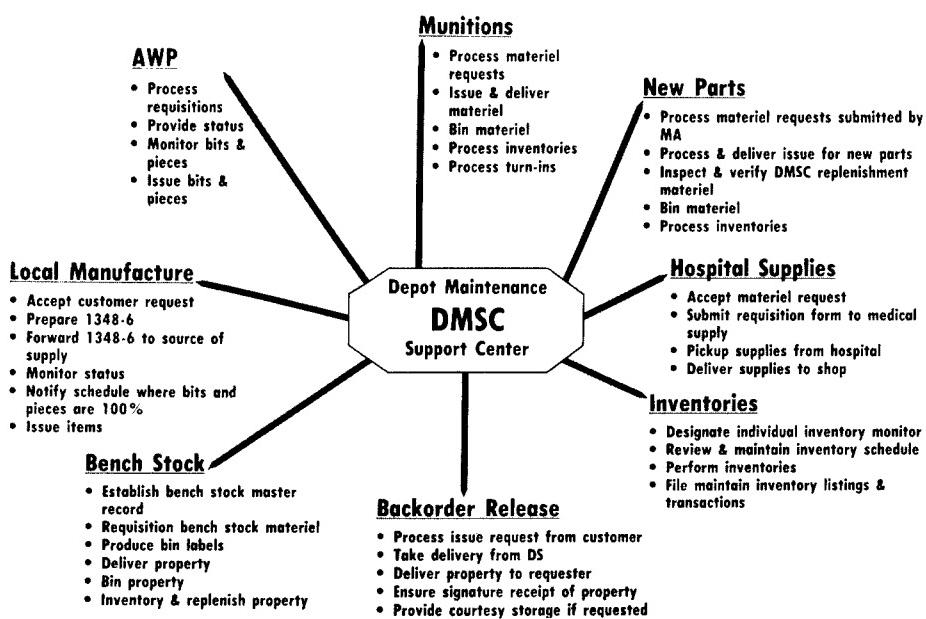


Figure 4.

AUTOMATED DELIVERY SYSTEMS

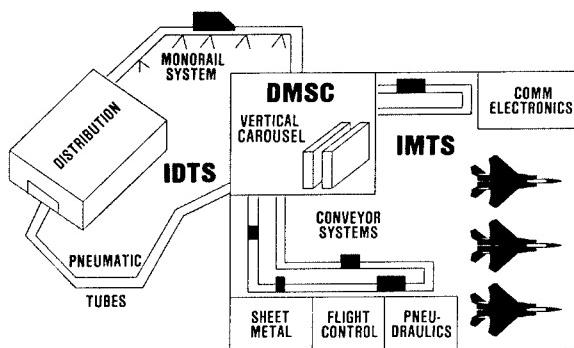


Figure 5.

Program Objectives

Integrating distribution and repair functions offers the potential for high payoff. PACER INTEGRATE will take advantage of state-of-the-art technology and innovative processes and procedures to improve distribution support to depot maintenance. PACER INTEGRATE will reduce the DMS AFIF investment in materiel inventory, improve asset availability, streamline processes and procedures, improve materiel delivery and storage systems, better utilize manpower, expand the depth and range of stock, and promote paperless operations.

Data Systems Support

Interfacing all the data systems involved in the organic depot maintenance materiel support is a formidable task. Nevertheless, interconnecting is necessary to develop the improved systems to ensure optimum maintenance support. Facing the designers were systems from several different functional areas with computer programs that had been developed independently.

The PACER INTEGRATE initiative will merge the materiel management capabilities provided through the Exchangeable Production System (EPS), Depot Maintenance Management Information System (DMMIS), and Stock Control and Distribution (SC&D) System (Figure 2). "These systems will give us the asset visibility we need to reduce excesses and better manage our parts support to maintenance, particularly as defense dollars become smaller," the Colonel added.

Single Manager Concept

A key element of the program has been to put distribution functions back into the hands of distribution people. Under PACER INTEGRATE, the distribution functions that support the depot maintenance effort will be transferred to the ALC Distribution activity. Distribution will have total accountability and responsibility for depot maintenance distribution support. Through PACER INTEGRATE and the Logistics Management Systems (LMS) modernization programs, AFLC will consolidate fragmented distribution processes under a single manager, enhance inventory visibility, and improve the ability to match specific repair requirements to available assets.

Depot Maintenance Support Center

One of the first objectives of PACER INTEGRATE is to replace the current Maintenance Inventory Centers (MICs) with Depot Maintenance Support Centers (DMSCs) (Figure 3). Each DMSC will store and issue forward stocked materiel directly from the Air Force Stock Fund instead of holding inventory in the Air Force Industrial Fund. The DMSCs will also provide a wide range of supply and transportation services to depot maintenance production areas (Figure 4). In addition to forward stocks, the centers will manage production items awaiting parts and local manufacturing assets, provide packaging support, and deliver parts directly to the technician using various automated intra-depot transportation systems. The ALCs have completed the site surveys identifying over \$40 million in requirements for

the DMSC modernization and Intra-Depot/Intra Maintenance Transportation System (IDTS/IMTS) projects (Figure 5). DMSC/IDTS/IMTS projects represent approximately 62% of AFLC's Mechanized Materiel Handling System (MMHS) program in fiscal years 1991 - 1993 and 29% of the total MMHS budget for those years.

Prototype

Ogden ALC will pioneer the way for the other ALCs in this major shift of management responsibility for the distribution support to the maintenance functions. Major General Dale W. Thompson, Commander, Ogden ALC, and Mr Olin A. Howard, Headquarters AFLC, Assistant DCS/Distribution, marked the grand opening of the first full prototype operation with a ribbon-cutting ceremony 19 November 1990. The prototype, lasting about 180 days, will be used to test and evaluate system interfaces, procedures, and distribution support prior to full-scale implementation. "We are already starting to see positive results at Ogden," commented Colonel McCoy. Post-post manual procedures have been simplified and these transactions can now be processed in 10 minutes or less instead of the 30 minutes to an hour under the old way of doing business. The local purchase processing has been cut by two-thirds. Delivery times for parts from distribution to maintenance have been chopped from three days to four hours. Additionally, almost \$500,000 in excess materiel from the six prototype DMSCs have been eliminated. The range and depth of stock will also be expanded to 30 days or the full range of the retail supply stockage level. Computer input terminals have also been placed in the production areas which will permit the implementation of a paperless requisitioning process.

PACER INTEGRATE - A Plan for the Future

This next generation distribution system will support current and future weapon systems with state-of-the art technology. PACER INTEGRATE is seen as a 20-year, strategic initiative to ensure AFLC's industrial base remains fully capable of meeting the fiscal and technological challenges of the next two decades. This initiative will strengthen and simplify the complex processes of distribution support to organic depot maintenance ensuring efficient wartime acceleration in support of global requirements.

PACER INTEGRATE crosses over into AFLC's data management, maintenance, transportation, communications, materiel management, and financial systems, according to Colonel McCoy. "All of those are things we have to integrate into a package to give us improved distribution support," he said.

"At this point, we are probably only scratching the surface," he continued. "As the ALCs start their detailed planning and look at their operations, they will be able to identify even further opportunities for improved support."

"Integrating distribution and repair functions is a high-priority concept," he said. "It is a new way of doing business. PACER INTEGRATE is a way for us to enhance user support, improve accountability, increase efficiency, and cut materiel costs in a time of light resources."

